APPENDIX 16-D

Wildlife Field Program Report

Coffee Gold Mine: Wildlife Field Program Report Version 1.2

Prepared For

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Down to Earth Biology

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REVISION SUMMARY

Version No.	Date	Revision Notes	Revision Authors
1.0	April 3, 2016	Original Version	
1.1	September 16, 2016	Final Version	L.Pigage & others
1.2	March 5, 2017	Incorporation of outstanding 2016 survey data & updated in response to Information Requests	A. MacLeod & others

EXECUTIVE SUMMARY

Kaminak Gold Corporation, a wholly owned subsidiary of Goldcorp Inc. (Kaminak; the Proponent) is proposing to develop a gold mine, known as the Coffee Gold Mine (Coffee Project; the Project) located 130 km south of Dawson, Yukon. The Project is scoped as an open pit gold mine using a cyanide heap leach process to extract gold from the ore. The Project will be accessed by road from Dawson via a 214 km single-lane, gravel road with pull outs. The majority of the access is along existing road which will be upgraded, with approximately 37 km of new road to be constructed. There will be two river crossings on the Stewart and Yukon rivers that will use ice-bridges in the winter and barges in the summer.

In 2014, Kaminak retained EDI Environmental Dynamics Inc. (EDI) to conduct wildlife baseline studies for the Project in anticipation of future regulatory requirements. The purpose of the Coffee Project's Wildlife Baseline Field Program is to document and characterize wildlife information to support the Project Proposal to be submitted to the Yukon Environmental and Socio-economic Assessment Board (YESAB) Executive Committee for screening under the *Yukon Environmental and Socio-Economic Assessment Act* (YESAA) as well as the Quartz Mining License and Type A Water License applications.

Focal species for the Wildlife Baseline Field Program include species of conservation concern and/or species with social, cultural, or economic value, and include: caribou (both the Fortymile and Klaza herds), moose, thinhorn sheep, grizzly bear, grey wolf, furbearers, collared pika, bats, and small mammals.

This report summarizes the methods and results from wildlife surveys conducted by EDI between 2014 and 2016 for mammals, including:

- Early and late winter ungulate surveys
- Aerial thinhorn sheep surveys
- Ground based sheep investigations
- Grizzly bear den surveys
- Snow tracking surveys
- Remote camera studies
- Mineral lick and wildlife trail investigations
- Collared pika surveys
- Acoustic bat surveys
- Small mammal trapping; and
- Caribou pellet removal plots.

ACKNOWLEDGEMENTS

Numerous biologists from Environment Yukon provided valuable input into the design of field studies and baseline analysis including Mike Suitor, Mark O'Donoghue, Ramona Maraj, Troy Hegel, Sophie Czetwertynski, Kyle Russell, Tom Jung, Bruce McLean, Richard Cherepak, and Julia Ahlgren among others.

Kaminak's Environmental Monitors assisted with many of the wildlife baseline surveys and programs including: Robert Farr, Derek Scheffen, Andrew Taylor, and Evan Warren.

The Tr'ondëk Hwëch'in, Natural Resources Department, provided the following observers for ungulate surveys: George MacLeod, James Roberts. We also had assistance for the late winter ungulate surveys from: Geoff Ranson, Spencer Wallace, Becky Partridge, and David Curtis.

AUTHORSHIP

This report was prepared by EDI Environmental Dynamics Inc. Staff who contributed to this project include:

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EDI biologists and technicians that conducted the fieldwork for the Wildlife Field Program include: Dawn Hansen, Brodie Smith, Lee Hawkings, Anne MacLeod, Lea Pigage, Graeme Pelchat, Todd Mahon, Meghan Marjanovic, Erica Van Vlack, Danny Skookum, Kelsey Russell, and Ben Schonewille.

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ACRONYMS AND ABBREVIATIONS

°C .... Degrees Celsius

CCME .... Canadian Council of Ministers of the Environment

CEQG .... Canadian Environmental Quality Guidelines

cm .... Centimetre

Coffee Project, the Project .... Coffee Gold Mine

COSEWIC .... Committee on the Status of Endangered Wildlife in Canada

EDI .... Environmental Dynamics Inc.

EMs .... Environmental Monitors

GMS .... Game Management Subzone

GPS .... Global Positioning System

Kaminak .... Kaminak Gold Corporation

km .... Kilometre

km^2 .... Square Kilometres

km/h .... Kilometer Per Hour

LSA .... Local Study Area

m .... Metre

min/km^2 .... Minute Per Square Kilometre

mg/kg .... milligrams per kilogram

NAR .... Northern Access Route

PDA .... Potential Disturbance Area

RBV .... Red-backed Vole

RSA .... Regional Study Area

SARA .... *Species at Risk Act*

UTM .... Universe Transverse Mercator

WKA ..... Wildlife Key Area

YESAA ..... *Yukon Environmental and Socio-economic Assessment Act*

YESAB ..... Yukon Environmental and Socio-economic Assessment Board

% ..... Percent

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1 INTRODUCTION

Kaminak Gold Corporation, a wholly owned subsidiary of Goldcorp Inc. (Kaminak; the Proponent) is proposing to develop a gold mine, known as the Coffee Gold Mine (Coffee Project; the Project) located 130 km south of Dawson, Yukon (Figure 1-1). The Project is located on Crown Land within the traditional territory of Tr'ondëk Hwëch'in and the asserted area of White River First Nation. A portion of Kaminak's claim block is located in Selkirk First Nation's traditional territory. The proposed road alignment is located with the traditional territory of Tr'ondëk Hwëch'in, portions of which are located within the shared traditional territories of Selkirk First Nation and the First Nation of Nacho Nyak Dun and the asserted area of White River First Nation.

The Project is scoped as an open pit gold mine using a cyanide heap leach process to extract ore. The Project will be accessed by road from Dawson via a 214 km single-lane, gravel road with pull outs referred to as the Northern Access Route (NAR). The majority of the access is along existing road which will be upgraded. There will be two river crossings on the Stewart and Yukon rivers which will use ice-bridges in the winter and barges in the summer.

In 2014, Kaminak retained EDI Environmental Dynamics Inc. (EDI) to conduct wildlife baseline studies for the Project in anticipation of future regulatory requirements. The Wildlife Baseline Field Program is one of many environmental baseline programs that have completed for the Coffee Project since 2010. The Wildlife Baseline Field Program was designed to focus on addressing data gaps in existing wildlife information that will be required to complete an effects assessment. This report summarizes the wildlife surveys conducted by EDI between 2014 and October 2016 for mammals. A separate report summarizing bird surveys conducted for the Coffee Project has also been prepared (*Coffee Gold Mine: Bird Baseline Report* (EDI 2017).

1.1 WILDLIFE FIELD PROGRAM OBJECTIVES

The purpose of the Coffee Project's Wildlife Baseline Field Program is to document and characterize wildlife information to support the Project Proposal to be submitted to the Yukon Environmental and Socio-economic Assessment Board (YESAB) Executive Committee for screening under the *Yukon Environmental and Socio-Economic Assessment Act* (YESAA) as well as the Quartz Mining License and Type A Water License applications. Specific objectives for the wildlife field program are:

- Assess the abundance and distribution of focal wildlife species within the Project area.
- Identify and describe key habitats that are important for focal wildlife species.
- Identify and collect information on wildlife transportation corridors.
- Identify the presence and habitat use of species at risk using the Project area.

1.2 FOCAL SPECIES

Recognizing that all species and habitats play an important role in ecological function (N. Becker, pers. comm. 2016), the Wildlife Baseline Field Program included some studies that looked broadly at all wildlife species present in the Project area. However, the Wildlife Baseline Field Program also included several studies that focussed on specific focal species. Focal species, or species groups, for the Wildlife Baseline Field Program include:

- Caribou (*Rangifer tarandus*)
- Moose (*Alces alces*)
- Thinhorn sheep (*Ovis dalli*)
- Grizzly bear (*Ursus arctos*)
- Grey wolf (*Canis lupis*)
- Furbearers
- Bats (*Myotis* spp.)
- Collared pika (*Ochotona collaris*)
- Small mammals.

Focal species for the Wildlife Baseline Field Program were selected to include species of conservation concern and/or species with social, cultural, or economic value. They reflect the recommendations of Yukon Government, Department of Environment (Environment Yukon) and consultation with local First Nations (e.g., N. Becker, pers. comm. 2016) and other stakeholders, and are generally reflective of the species highlighted in Traditional Knowledge (e.g. Mishler and Simeone 2004; Tr'ondëk Hwëch'in 2012a, 2012b; Bates and DeRoy 2014; Mishler and Simeone 2014). In particular, EDI met with Environment Yukon to discuss wildlife data requirements for the Project in 2014. In 2015, with the addition of the NAR, Environment Yukon provided EDI with the document *Kaminak Gold Corporation at Coffee Creek – Dawson Goldfields Access Consideration, Wildlife Baseline Information* (Suitor 2015). This document recommended that caribou, moose, and mineral licks be considered as priorities for baseline data collection, and that baseline surveys also be conducted for grizzly bear, wolverine, and collared pika due to specific sensitivities relating to those species (Suitor 2015). The recommendations in this document were largely followed in the Project baseline studies.

Table 1-1 outlines the wildlife and wildlife habitat surveys that have been conducted for the Coffee Project between 2014 and October 2016 by EDI.

Table 1-1. Wildlife and wildlife habitat surveys conducted for the Coffee Project (February 2014–October 2016).

Survey Type	Target Species	Dates Conducted
Early Winter Moose Surveys[1]	Moose	November 13–16, 20 and 22, 2015
Late Winter Ungulate Surveys	Moose and caribou	February 28–March 5, 2014 March 10–14, 2015 March 7–10, 2016
Aerial Thinhorn Sheep Surveys	Thinhorn sheep	November 22, 2015 (early winter) February 29, 2016 (late winter) May 25, 2016 (lambing) June 13, 2016 (summer) October 24, 2016 (early winter)
Ground-based Sheep Investigations	Thinhorn sheep	May 27–August 28, 2015 June 14–17, 2016 October 25–26, 2016
Grizzly Bear Den Surveys	Grizzly bear	March 21, 31, April 22 and May 6, 2016
Snow Tracking Surveys	Caribou, moose, wolves, wolverine and other furbearers	February 11–15, 2015 February 22–25, 2016
Remote Camera Studies	Thinhorn sheep, moose, caribou and wolves	May 2015–October 2016
Mineral Lick Investigation	Ungulates	August 2–5, 2015 August 26–30, 2015 April 25 and 26, 2016 June 15, 2016
Acoustic Bat Surveys	Bats	August 1–11, 2015
Collared Pika Presence/Not Detected Surveys	Collared pika	August 25–27, 2014 August 28–30, 2015
Small Mammal Trapping	Mice and voles	August 26–31, 2015
Pellet Removal Plots	Caribou	Summers of 2014, 2015, and 2016
Caribou Pellet Collection and Dietary Analysis	Caribou	Summer of 2014
Java Road Wildlife Trail Investigations	All species	Summer of 2014
Wildlife Camp Log	All species	2010, 2011, 2013, 2014, 2015, 2016

[1] Conducted in conjunction with Environment Yukon

1.3 STUDY AREAS

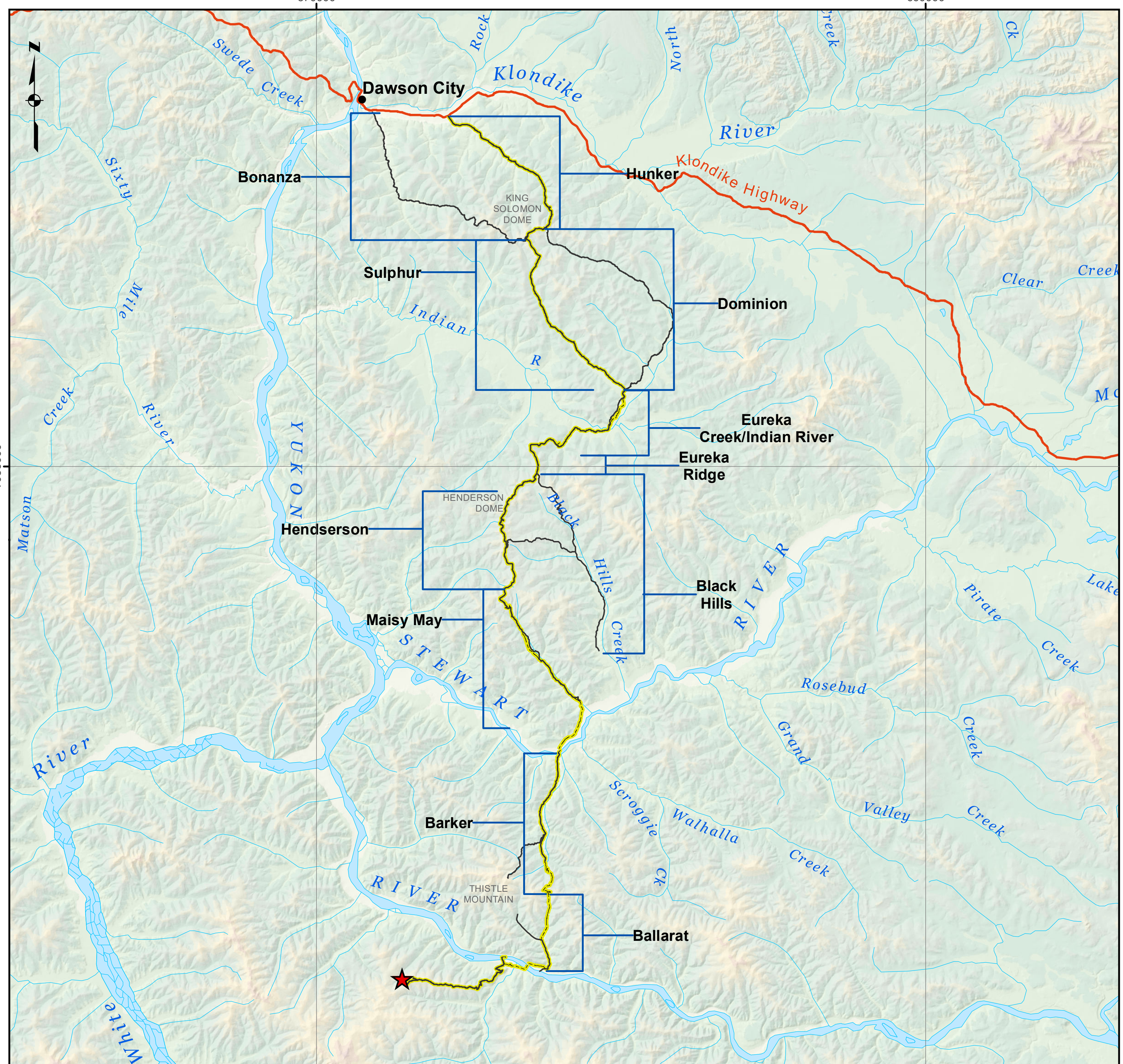
The **Regional Study Area** (RSA) was established to assess the abundance and distribution of most large wildlife species in the Project area, including moose, thinhorn sheep, mule deer (*Odocoileus hemionus*), grizzly and black bears (*Ursus americanus*), wolf, wolverine (*Gulo gulo*), and other furbearers. Many of the wide-ranging mammals that occur in the survey area are managed by Yukon Environment as big game species within Game Management Subzones (GMS). Accordingly, the RSA was delineated to include any GMS that intersect, or are in close proximity to, the proposed Project footprint. The size of the RSA is 13,661 km².

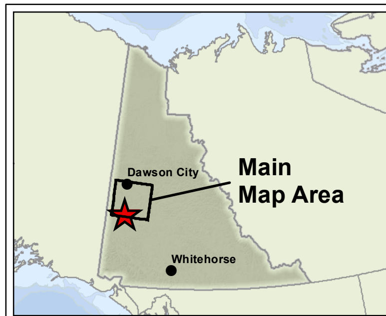
To assess the abundance and distribution of wildlife that have smaller, or more localized, habitat requirements, a **Local Study Area** (LSA) was established. Around the mine site, the LSA is delineated based on the height of land while encompassing a minimum buffer of 1 km around the proposed Project footprint. Along the NAR, the LSA includes a 1 km buffer on either side of the road. The wildlife LSA is approximately 473 km² in size.

In addition to the RSA and LSA, other spatial descriptions referenced in this report include the Coffee Property, Project footprint, and survey extent. The **Coffee Property** refers to the entire Coffee claim block which covers an area approximately 50 km by 12 km; Kaminak has been conducting exploration activities within the Coffee Property since 2009. Existing infrastructure within the Coffee Property includes a 23 km access road (referred to as the Java Road) that runs between the barge landing on the Yukon River and the Supremo and Latte deposit areas, the Coffee camp located adjacent to the Yukon River, a gravel airstrip to the south of the camp, and various surface disturbances resulting from exploration activities. The **Project footprint** is the area that encompasses all proposed Project infrastructure included in the Project Proposal for the YESAB Executive Committee review, including the proposed mine site and the existing and new sections of the NAR. Figure 1-2 displays the boundaries of the RSA, LSA and the Coffee Property.

Many of the wildlife surveys conducted for the Wildlife Baseline Field Program did not encompass the entire LSA or RSA. For those surveys, a **survey extent** was delineated to ensure that the survey data collected was biologically relevant and focused on habitats used by the focal species. Survey extents for each of the specific surveys are described in the relevant survey sections. Since the initiation of wildlife surveys for the Coffee Project, some survey extents have shifted several times to accommodate changes related to Project access (e.g., late winter ungulate survey extents), specifically:

- In 2014, Kaminak was considering an access road connecting to the existing Freegold Road which would provide access to the mine site via Carmacks, Yukon. This is similar to the access road proposed by Casino Mining Corporation for their Casino Project, located approximately 31 km southeast of the Coffee mine site. Consequently, the 2014 baseline surveys included a possible road alignment extending southeast. This potential access road was dropped by Kaminak prior to the 2015 baseline surveys.
- In 2015, Kaminak began consideration for an access road through the Dawson Goldfields which would provide access to the mine site via Dawson, Yukon. This would ultimately become the currently proposed NAR; however, earlier in 2015, the final alignment was not yet determined. Thus, the 2015 baseline surveys included several road alignment options through the Goldfields area.
- In 2016, surveys focussed on the final alignment for the NAR as well as the mine site.





Legend

- Coffee Gold Mine
- Java Road
- Existing Access
- Proposed Route
- Highway

FIGURE: 1-1

Overview of the Coffee Project

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific.

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

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KM

Map Reference Scale: 1:800,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

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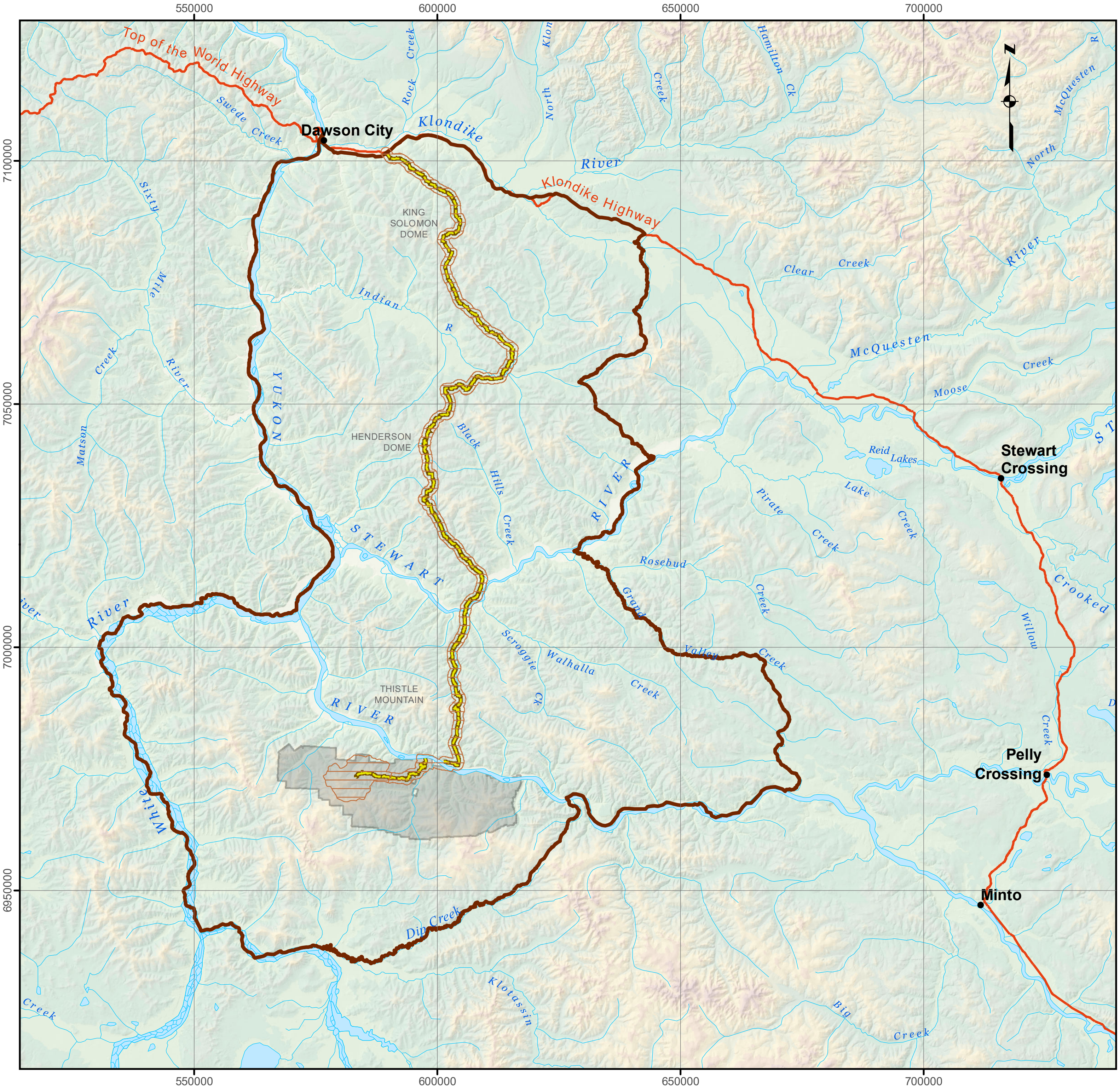

Legend

- Proposed Route
- Highway
- Local Study Area
- Regional Study Area
- Coffee Property

FIGURE 1-2

Coffee Project wildlife study areas

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Study areas created by EDI Environmental Dynamics Inc.

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2 EARLY WINTER MOOSE SURVEYS

In November 2015, Environment Yukon conducted an early winter moose survey in the Dawson Goldfields area, including the northern sections of the RSA south to the Stewart River. EDI provided an observer for four days to assist with this survey (November 13–15, 2015). Following the completion of this survey, EDI, in conjunction with Environment Yukon, extended the early winter moose survey to include the area between the Stewart and Yukon rivers along the proposed NAR. The purpose of the extended survey was to document moose distribution and composition in the RSA between the Stewart and Yukon rivers. A report on the methods, study area and results of Environment Yukon's Dawson Goldfields survey is being prepared by Environment Yukon. The methods and results of the survey between the Yukon and Stewart rivers are presented below.

2.1 METHODS

The 2015 early winter moose survey was conducted November 20 and 22, 2015 by EDI in conjunction with Environment Yukon. The survey focussed on habitats within approximately 10 km of the proposed NAR between the Stewart and Yukon rivers. In order to facilitate comparison of survey results between the EDI survey and Environment Yukon's 2015 Dawson Goldfields survey, EDI survey methods directly followed Environment Yukon's protocol established for the Dawson Goldfields survey. Survey stratification was developed by Environment Yukon and was based on the same model used in the Dawson Goldfields survey.

The early winter moose survey was conducted using a stratified block sampling method. The EDI survey extent was approximately 736 km^2, and consisted of 46 – 4 km x 4 km blocks (Figure 2-1). Each block was stratified by Environment Yukon as either HIGH or LOW, depending on the probability of moose occurrence. Based on the stratification, there were 25 HIGH blocks and 21 LOW blocks within the survey extent; of these, nine HIGH blocks and four LOW blocks were surveyed.

The survey was conducted using a Bell 206 Jet Ranger helicopter, with one navigator and two observers. Flights were conducted by Trans North Helicopters out of Dawson. The helicopter was flown approximately 200–300 m above ground level, at approximately 150 km/h. Weather conditions were generally good during the survey, with partly cloudy to overcast skies, minimal wind, good visibility and temperatures ranging from - 25°C to - 30°C. The survey was delayed by a day on November 21, 2015 due to poor weather conditions.

Survey blocks were selected to provide even distribution within the study area. Transects were flown through each block, with approximate transect spacing of 500 m (Figure 2-1). Age class and sex were documented for each moose observed.

2.2 RESULTS

A total of 48 moose were observed in 34 groups during the 2015 early winter moose survey (Figure 2-2). Of these, eight groups were cow and calf. Overall, moose were observed alone or in groups of two or three individuals. Moose were broadly distributed throughout the survey area. As expected, moose were found in higher concentrations in the HIGH blocks. The moose were found in a variety of habitats including subalpine ridges, old burn forests, mixed forest slopes and valley bottoms. Analysis of the survey results was conducted by Environment Yukon (in conjunction with the analysis of the Dawson Goldfields survey); based on the EDI survey findings, an estimated 148 moose (90% CI of 117-189) are expected within the EDI survey extent with a density of 206 moose/1000 km^2.

In addition to moose, incidental observations made during the 2015 early winter moose survey included a total of 625 caribou observed in 57 groups (Figure 2-3). The majority of the caribou were observed in the subalpine near Thistle Mountain, with a few groups observed in lowland black spruce forests. Single caribou were observed twice; however most caribou were found in groups ranging from two to 110 individuals. Based on collar data, these caribou are most likely from the Fortymile caribou herd. Also during the 2015 early winter moose survey, 27 sharp-tailed grouse (*Tympanuchus phasianellus*) were observed in five groups — all in the subalpine.

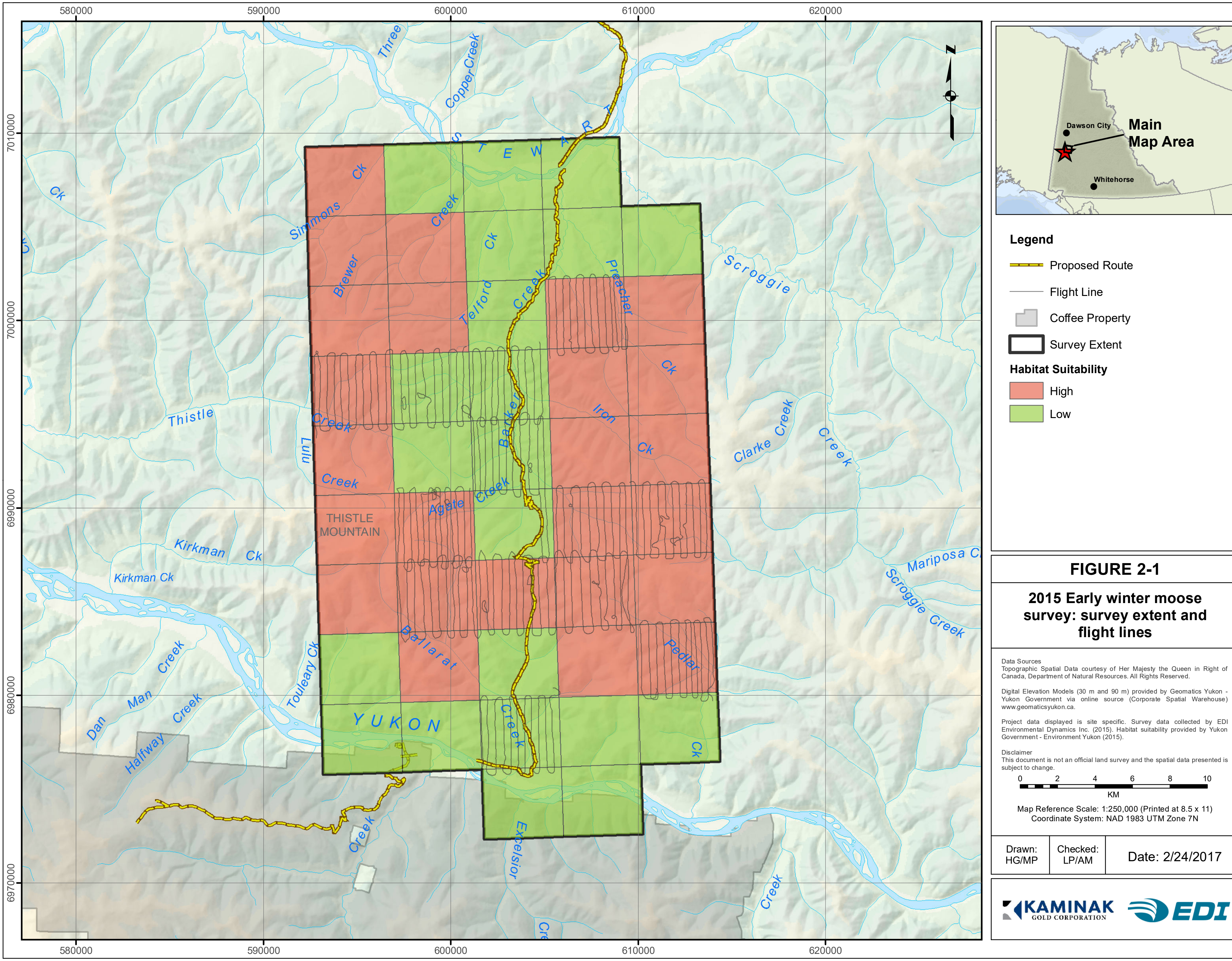

FIGURE 2-1

2015 Early winter moose survey: survey extent and flight lines

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2015). Habitat suitability provided by Yukon Government - Environment Yukon (2015).

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EDI

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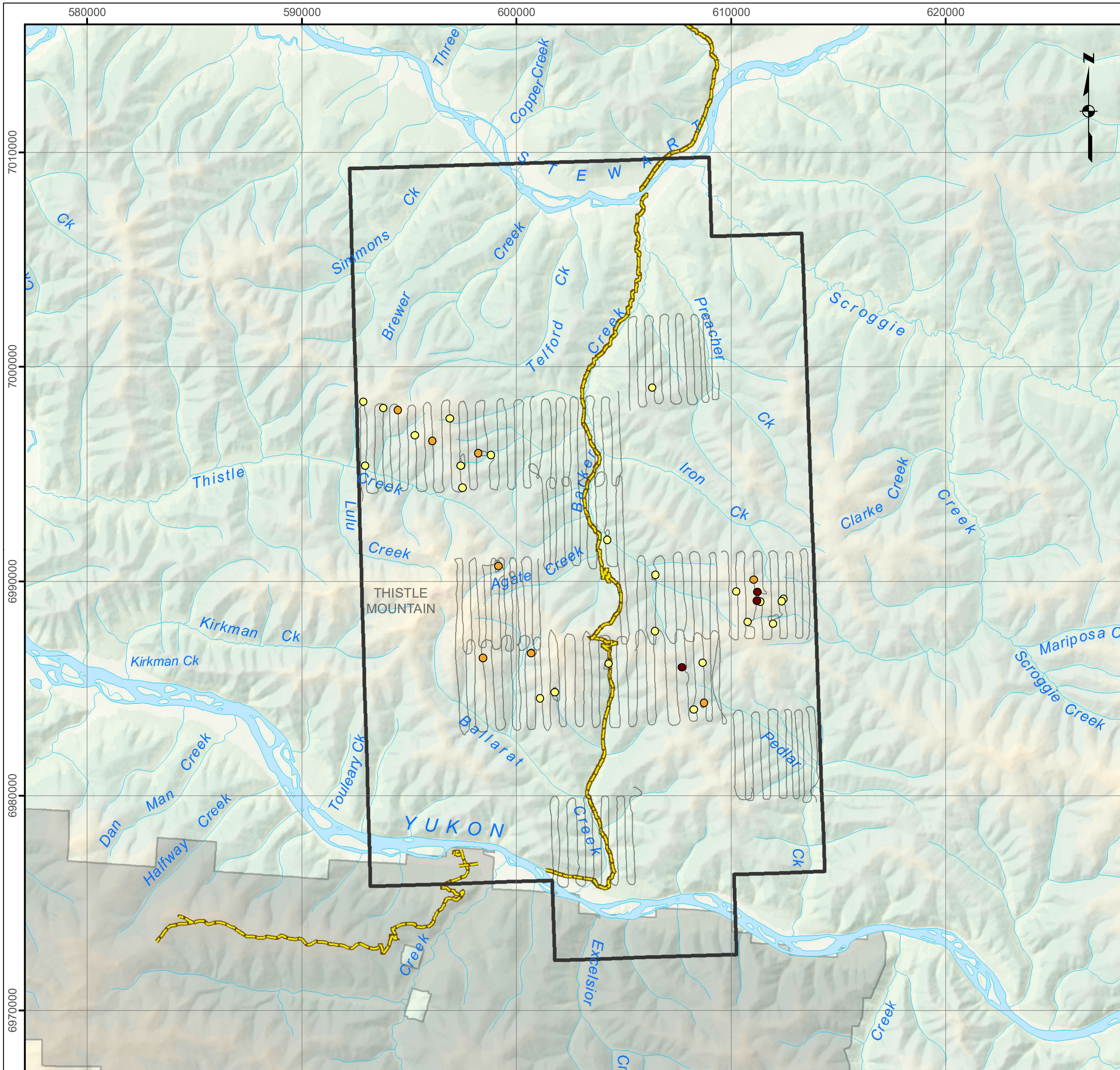

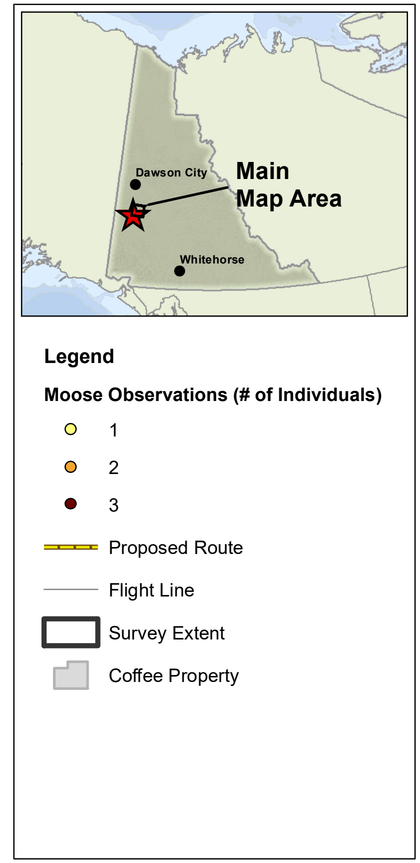

FIGURE 2-2

2015 Early winter moose survey: moose observations

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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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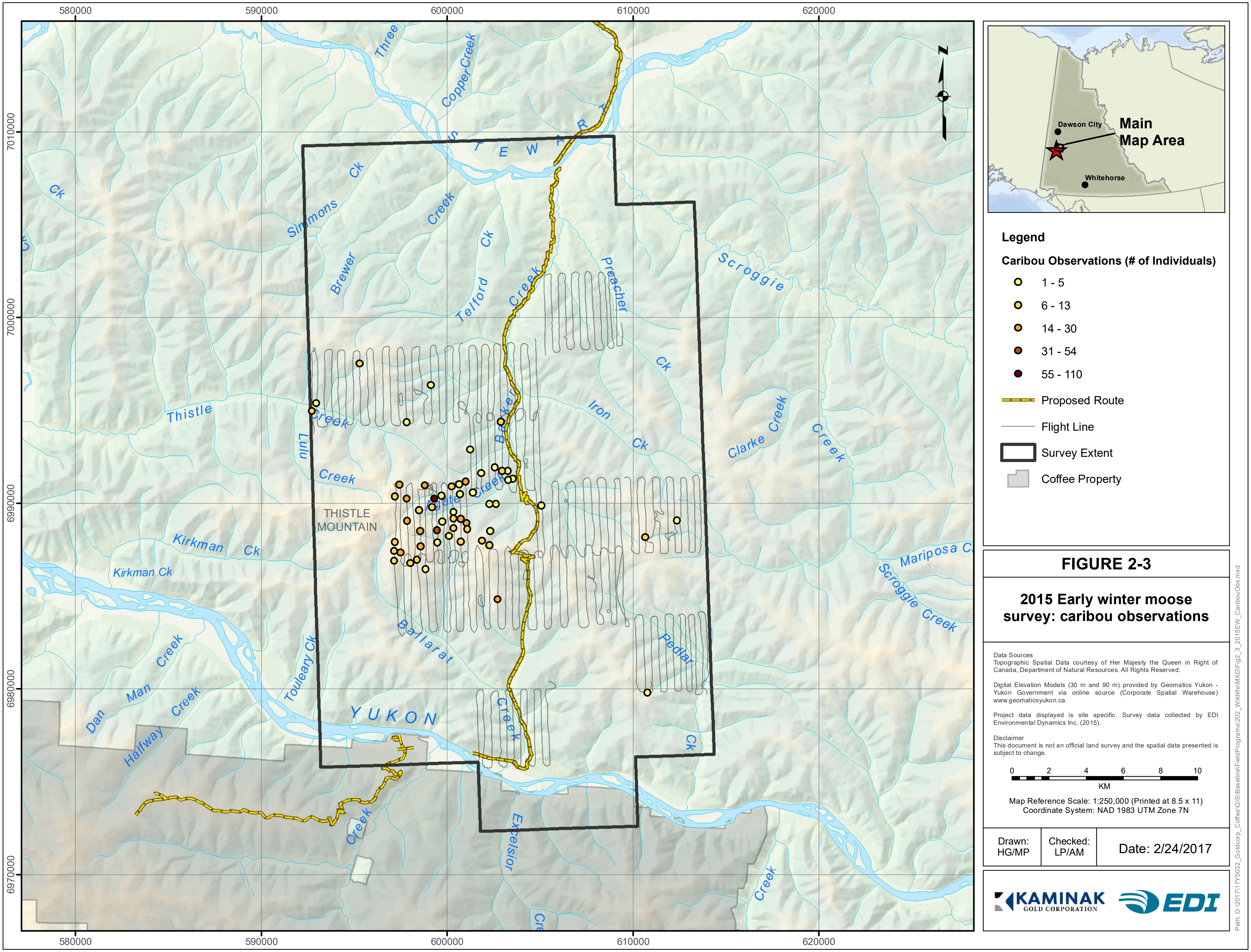

FIGURE 2-3

2015 Early winter moose survey: caribou observations

Data Sources
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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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3 LATE WINTER UNGULATE SURVEYS

Late winter is typically the most difficult time of year for ungulates due to the scarcity of browse; the influence of snow cover; and the high energetic demands of the late winter season. For this reason, identifying key areas — like late winter habitat — is important for ungulates. Late winter ungulate surveys for the Coffee Project were conducted to document the distribution of moose, and caribou if present, and to identify key areas that are important for moose during the late winter period.

In 2014, 2015, and 2016, regional-scale surveys were conducted using intensive stratification methods. The intensive stratification method was also used for moose surveys conducted in the region by Environment Yukon in 2012; and moose and caribou surveys conducted by Environment Yukon and Casino Mining Corporation in the neighbouring Carmacks West Moose Management Unit and the Carmacks West-Casino Trail area.

The 2014 late winter ungulate survey for the Coffee Project was conducted in collaboration with the late winter ungulate survey for the Casino Project (located directly to the southeast). Surveying both the Coffee and Casino Project areas in a consistent manner allowed for comparable results in a regional context. The Casino survey results are available in EDI 2014a. The sections below outline the results of the Coffee survey.

3.1 METHODS

The survey extent for the late winter ungulate surveys shifted several times throughout the course of the wildlife baseline studies to accommodate changes related to Project access (refer to further discussion in Section 1.3); however the core area around the proposed mine site remained consistent across all years. The survey extents were selected to cover an area that is biologically relevant and is able to provide a regional context for potential Project-related effects. The annual survey extents are described further below.

For all late winter ungulate surveys, the survey extent was delineated into a grid of 4 km x 4 km blocks. Each block was flown at a transect spacing of 1 km intervals (i.e. four passes per block), and all large wildlife and fresh tracks were recorded. Tracks were recorded according to Environment Yukon's *Collecting Track Data during Early and Late Winter Moose Surveys* document (Environment Yukon 2011). Flights were generally conducted in four hour long segments. The aircraft was flown approximately 200–300 m above ground level, at approximately 150 km/h.

2014 Survey

The 2014 survey extent included the entirety of both Game Management Subzones (GMS) 503 and 509, where the majority of the Coffee Property lies. To account for some overlap with neighbouring GMSs, and the known distribution of some species (*i.e.,* thinhorn sheep presence near Ballarat Creek), the survey area also included select drainages in GMSs 313, 314, and 502. In total, the survey extent encompassed approximately 3,500 km² (Figure 3-1).

The 2014 survey was conducted over six days between February 28 and March 5, 2014 using a Cessna 206 aircraft. The survey was conducted by four people. The pilot was Gerd Mannsperger (Alpine Aviation). Navigators and observers were Kelsey Russell, Dawn Hansen, and Danny Skookum (EDI). The survey time to cover all blocks was approximately 26 hours with an average effort of approximately 0.45 min/km². An additional 10 hours were used to ferry to and from survey blocks.

Weather conditions were good during the survey, with clear, sunny skies, minimal wind, and temperatures ranging from -24°C to -32°C. Snow conditions for tracking were poor due to the lack of fresh snow and low snow depths throughout much of the survey area.

2015 Survey

The survey extent for the 2015 late winter ungulate survey included three landscape sections. The primary survey area was centered on the Coffee Property and was a repeat of the area surveyed in 2014. Additionally, the 2015 survey include two areas along potential access corridors — one extending to the east of the Coffee Property, and the other to the north (Figure 3-2). These areas were added to the 2015 survey to provide baseline data on two potential access routes. Collectively, the 2015 late-winter aerial survey extent encompassed approximately 7,300 km². It included the entirety of GMSs 503 and 509 where the majority of Kaminak's claim blocks lie, as well as parts of GMSs 302, 307, 308, 310, 311, 312, 313, 314, 315, 320, 502, 504, 510, 511, 522, 523, and 524.

The 2015 survey was conducted over five days (March 10–March 14, 2015 by two crews flying different sections of the survey area using a Cessna 206 and a Maule aircraft. The pilot for the Maule was Gerd Mannsperger (Alpine Aviation) with Brodie Smith (EDI) as the navigator and one observer, while the Cessna 206 pilot was Martin Hebert (Alpine Aviation) with Dawn Hansen (EDI) as the navigator as well as one to two observers. The survey time to cover all blocks was approximately 58 hours giving an average effort of approximately 0.47 min/km². An additional 8 hours were used to ferry to and from survey blocks.

Weather conditions were generally good during the survey, with clear, sunny skies, minimal wind, and temperatures ranging from -24°C to -34°C. The survey was delayed by a day due to poor weather conditions and inability to access the camp at Coffee Creek. On 13 March, the start time was delayed due to heavy snowfall and limited visibility. Snow conditions for tracking were excellent due to the fresh snow immediately prior to and again near the end of the survey. Although the recent snowfall contributed to good tracking conditions, there were low snow depths throughout much of the survey extent.

2016 Survey

The 2016 survey encompassed all of the 2014 and parts of the 2015 survey extent — the 2015 survey extent that extended east of the Coffee Property was dropped in 2016; additionally, the 2015 survey section extending north of the Coffee Property was modified slightly to reflect the updated alignment of the proposed NAR (Figure 3-3). The 2016 late-winter aerial survey area was approximately 6,350 km² and included the entirety of GMSs 503 and 509, as well as parts of GMSs 307, 308, 310, 311, 312, 313, 314, 315, and 502.

The 2016 survey was conducted over four days (March 7 – March 10, 2016) by two crews flying different sections of the survey extent using two Cessna 206 airplanes. The pilots were Gerd Mannsperger and Andrew Swenson (both Alpine Aviation) with Dawn Hansen and Brodie Smith (EDI) as the navigators. Each plane also had two observers for all survey flights.

The survey time to cover all blocks was approximately 44 hours giving an average effort of approximately 0.42 min/km². An additional 10.25 hours were used to ferry to and from survey blocks.

Weather conditions were generally good during the survey, with overcast to clear skies, high ceilings, minimal wind, and temperatures ranging from -8°C to 0°C. Snow conditions for tracking were poor as most of the survey area had not received fresh snow in many days. There also seemed to be relatively low snow depths throughout much of the survey extent.

3.2 RESULTS

2014 Survey

During the survey, 200 individual moose were observed in 125 groups. Moose and moose tracks were broadly distributed throughout the survey area, with concentrated observations in the west near the Donjek and White rivers (Figure 3-4). Moose were observed in isolation or in groups of two to seven individuals. The majority of moose were seen in burned forests and on relatively high elevation slopes (i.e. subalpine), which is somewhat atypical of moose during the late-winter.

A total of 1,146 caribou in 68 groups (ranging from 1 to 130 individuals) were observed during the survey. Caribou sightings were concentrated in the northern section of the survey extent, primarily in three clusters (Figure 3-5). Caribou tracks were more broadly distributed throughout the survey extent; however, they were generally concentrated in the central and northern sections. Some parts of the survey extent were covered extensively with continuous caribou tracks and cratering, demonstrating that caribou have likely been in the area for some time. Overall, caribou were distributed in a wide variety of habitats, from high elevation alpine and subalpine areas to low treed gullies. Within the Coffee Property, observations included both caribou sightings (~13 groups) and tracks.

Based on collar data, the majority of caribou sightings and tracks observed during the survey are likely from the Fortymile caribou herd. Caribou from the Klaza herd could also have been present, although the survey did not overlap the documented late winter range of the Klaza herd located to the southeast of the survey extent (Hegel and O'Donoghue 2015). Members of the Nelchina caribou herd may also have been present in the survey extent (M. Suitor, pers. comm.). It was not possible to visually distinguish caribou from the different herds.

Other incidental wildlife observations made during the survey included two wolves observed on top of an aspen ridge, above a group of caribou on the last day of the survey. Wolf tracks were difficult to distinguish in some parts of the survey extent due to the density of caribou tracks and cratering (wolves often take advantage of tracked out areas by following caribou tracks for ease of travel). No sheep were observed during the survey; however, suspected sheep tracks were noted on the hills above the Yukon River.

2015 Survey

During the survey, 185 individual moose were observed in 120 groups. Of these groups, 22 were cow and calf pairs, and one was a cow with two calves. Additionally, moose tracks (individual or groups of tracks) were noted 456 times during the survey. Moose and moose tracks were broadly distributed throughout the survey area, with concentrated observations in the west near the Donjek and White rivers (Figure 3-6) and north near Dawson. Moose were observed alone or in groups of two to five individuals. The majority of moose were seen in either old burned forest, in valley bottoms near placer mining disturbances, or on relatively high elevation slopes (i.e. subalpine).

A total of 21 caribou were observed during the 2015 survey. These were located in the northern section of the survey area, in two groups (16 and 5 individuals), and are believed to be from the Fortymile caribou herd (Figure 3-7). The caribou were observed in a mixed forest at higher elevation near and on the top of a slope. Caribou tracks were also observed in four additional locations — three of which are suspected to belong to the Klaza caribou herd and one (old) at the far edge of the White River.

Despite the larger survey extent, the number of caribou observed during the 2015 surveys was considerably less than during the 2014 surveys (n=21 in 2015; n=1,146 in 2014). This information is consistent with the 2015 collar data for the Fortymile caribou which indicated that the majority of the herd spent the winter northwest of the Project RSA.

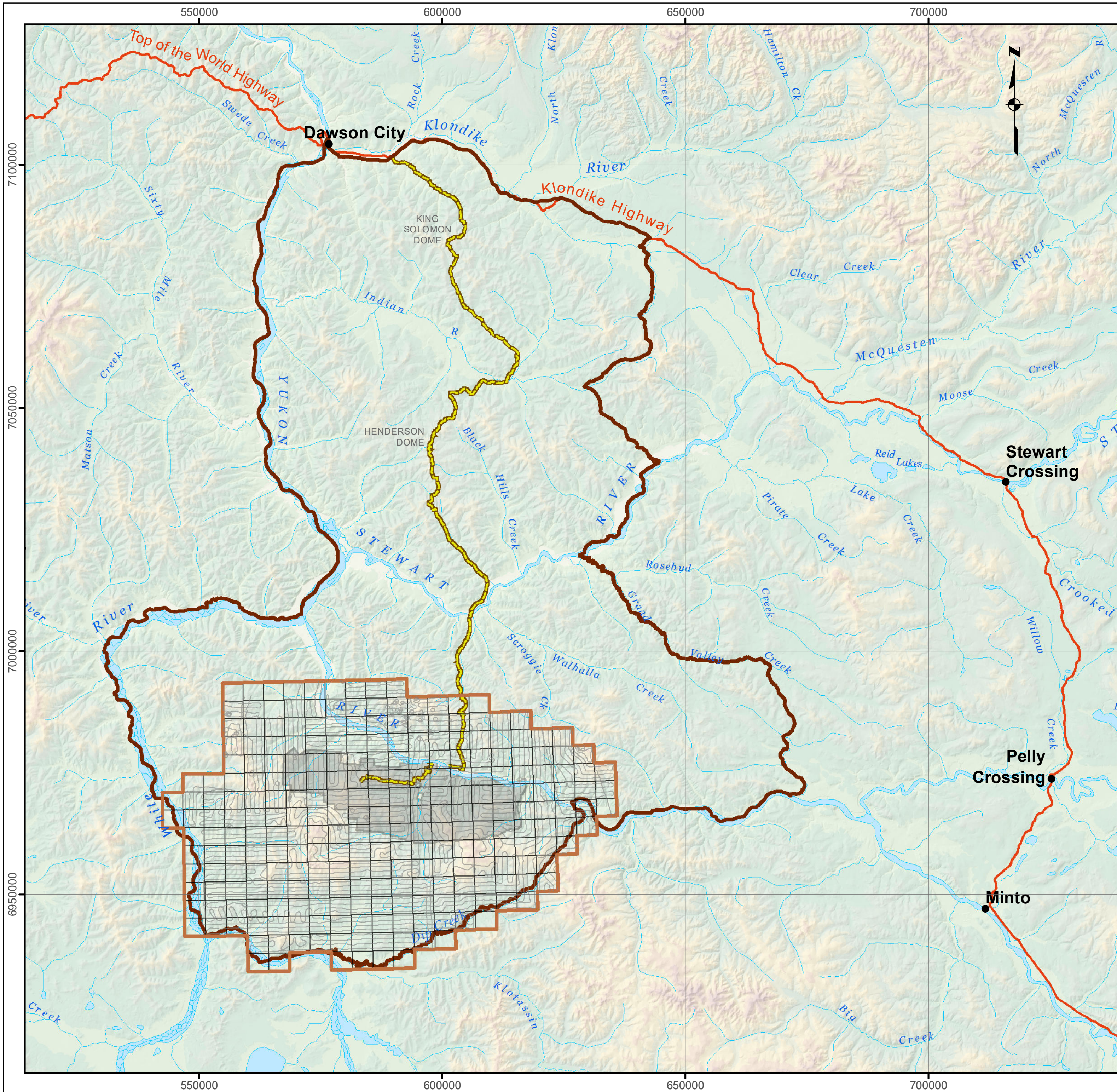
No other species were observed during the survey; however individual or groups of tracks from a number of different species were recorded including: wolf (10), fox (25), sheep (4), and marten (1). Additionally, near the Donjek River and White River tracks were noted but not recoded because they were not fresh, and were suspected to either be sheep or deer.

2016 Survey

During the survey, 239 individual moose were observed in 170 groups. Of these groups, ten were cow and calf pairs, and one was a cow with two calves. Additionally, moose tracks (individual or groups of tracks) were noted 109 times during the survey. Moose and moose tracks were broadly distributed throughout the survey area, with concentrated observations in the west near the Donjek and White rivers as well as in old burn areas between the Stewart and Indian rivers and just north of the Indian River (Figure 3-8). Moose were observed alone or in groups containing two to three individuals. The majority of moose were seen in either old burned forest, in valley bottoms near mining disturbance, or on mid-elevation forested slopes. Compared to the 2014 and 2015 late-winter aerial surveys moose seemed to be located at lower elevations and in smaller groups.

A total of 290 caribou were observed in 32 groups ranging in size from one to ~40 animals. Caribou and fresh caribou tracks were located throughout the survey area except in the very southern regions, and are suspected to be from the Fortymile caribou herd (Figure 3-9). Old caribou tracks and cratering were seen in many of the survey blocks but were not recorded unless they were fresh.

Other species observed during the survey included a lynx (*Lynx canadensis*) near the Indian River, a wolverine within the Coffee Property approximately 7.5 km south of the existing road between the Yukon River and the proposed deposit (i.e., the Java Road), a pack of four wolves along the Yukon River near Britannia Creek and 40 sharp-tailed grouse in six groups throughout the study area. Tracks of other wildlife species were also recorded including wolf (n=43), wolverine (n=2), fox (n=1) and river otter (n=1).



Legend

- Proposed Route
- Highway
- Flight Line
- 2014 Late Winter Survey Grid
- 2014 Late Winter Survey Extent
- Regional Study Area
- Coffee Property

FIGURE 3-1

2014 Late winter ungulate survey: survey extent and flight lines

Data Sources
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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2014).

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0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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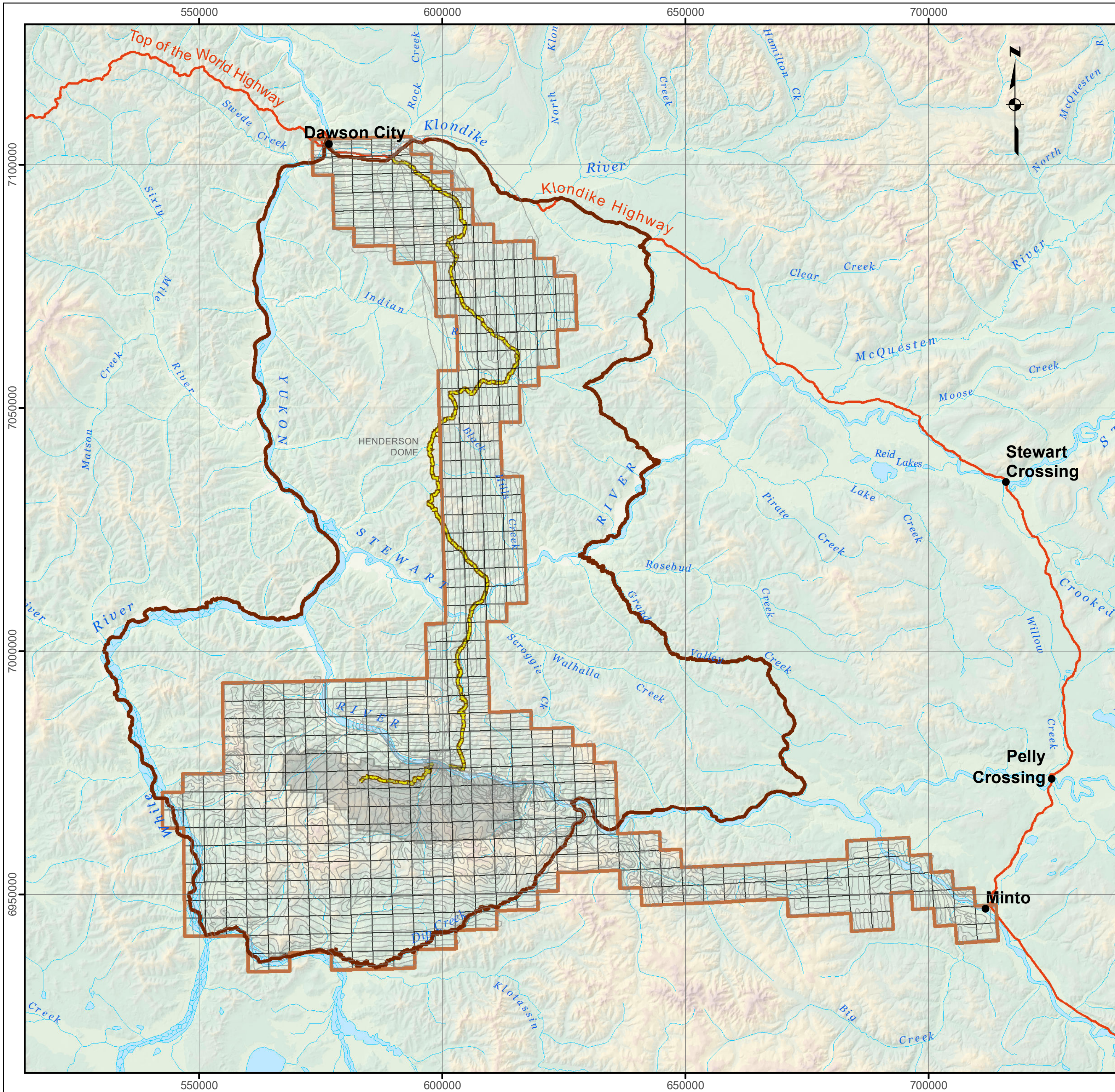

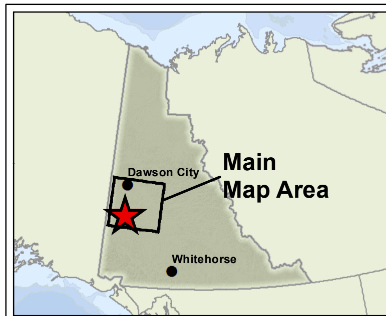

Legend

- Proposed Route
- Highway
- Flight Line
- 2015 Late Winter Survey Grid
- 2015 Late Winter Survey Extent
- Regional Study Area
- Coffee Property

FIGURE 3-2

2015 Late winter ungulate survey: survey extent and flight lines

Data Sources
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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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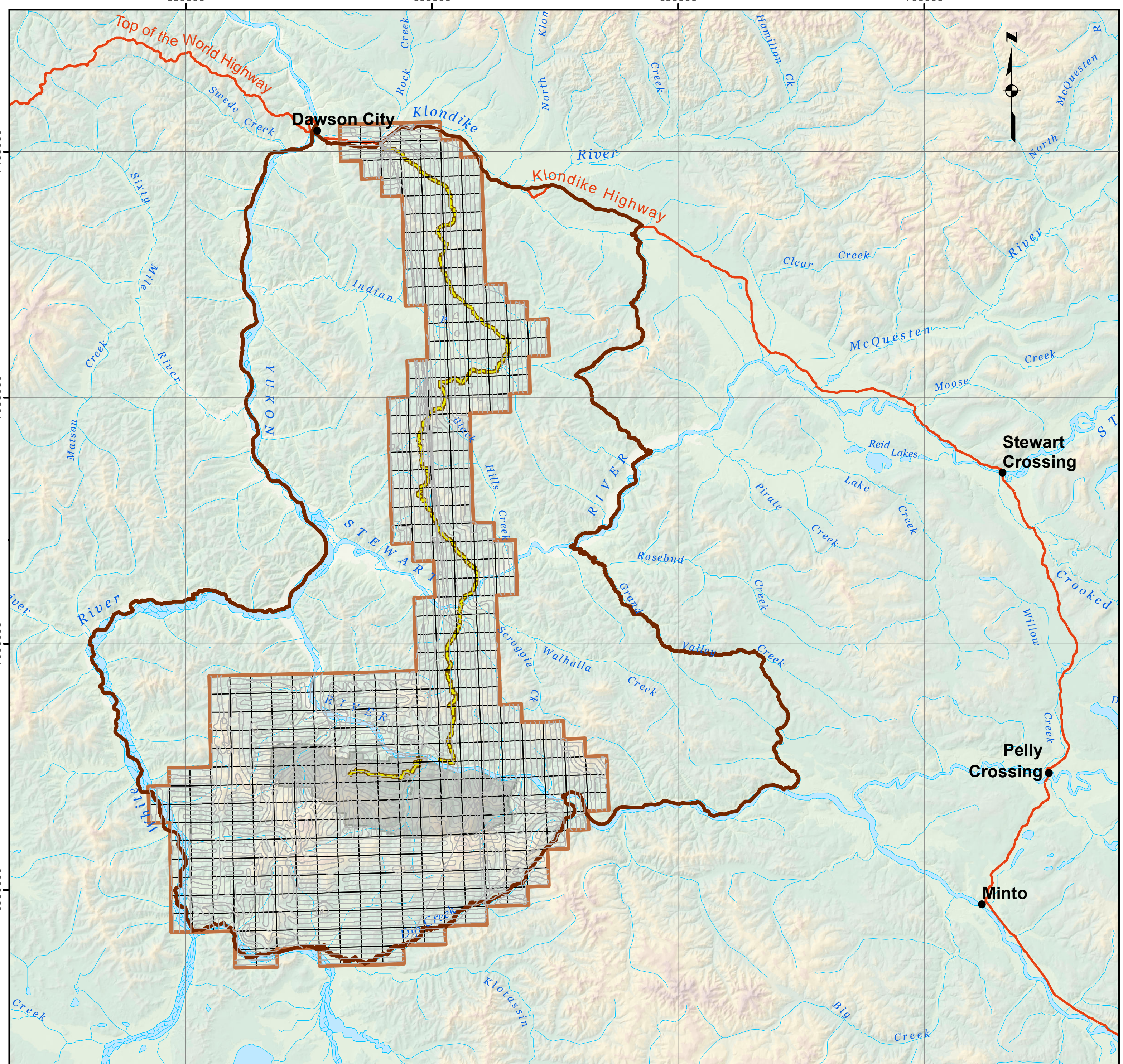

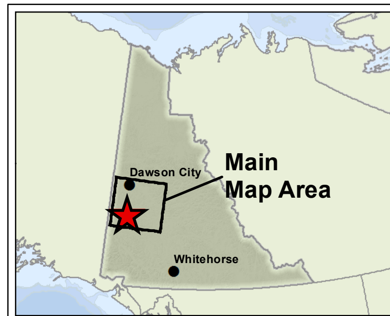

Legend

- Proposed Route
- Flight Line
- 2016 Late Winter Survey Grid
- 2016 Late Winter Survey Extent
- Regional Study Area
- Coffee Property

FIGURE 3-3

2016 Late winter ungulate survey: survey extent and flight lines

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KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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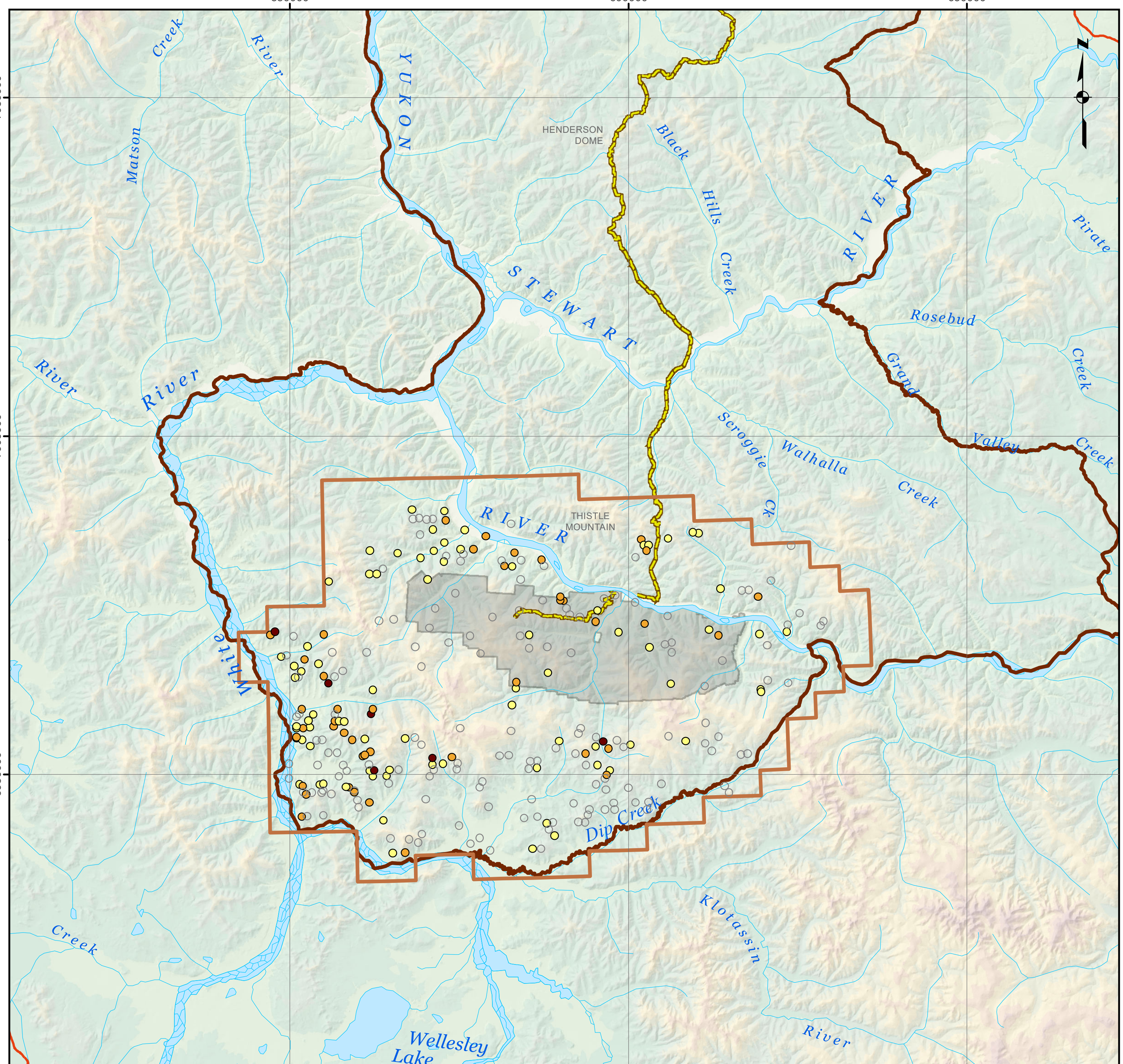

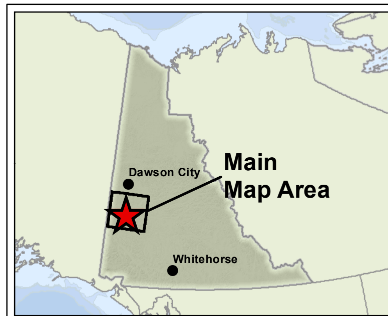

Legend

Moose Observations (# of Individuals)

- 1
- 2 – 3
- 4 – 7
- Moose Tracks
- Proposed Route
- 2014 Late Winter Survey Extent
- Regional Study Area
- Coffee Property

FIGURE 3-4

2014 Late winter ungulate survey: moose observations

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0 5 10 15 20 25 30
KM

Map Reference Scale: 1:800,000 (Printed at 8.5 x 11)
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Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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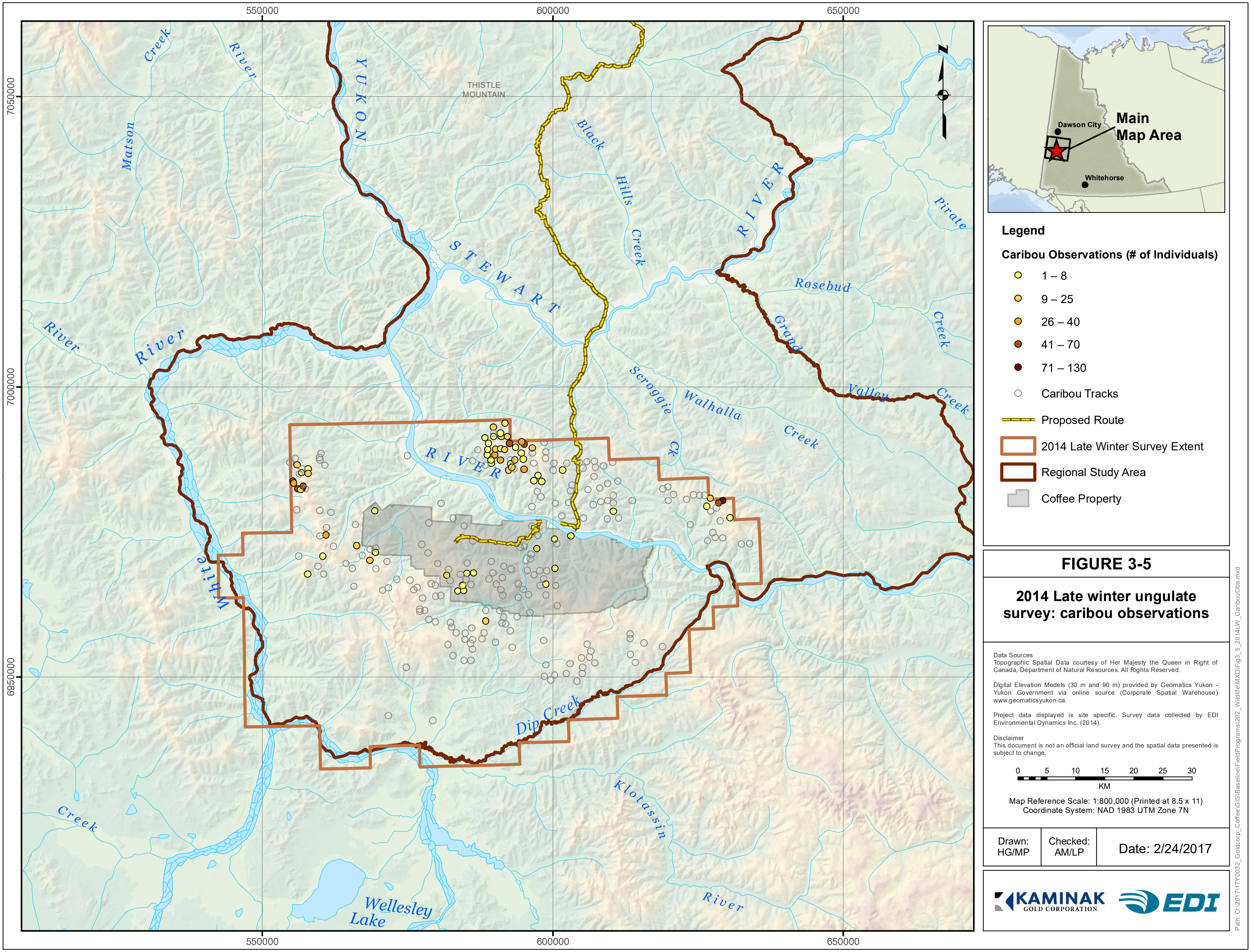

FIGURE 3-5

2014 Late winter ungulate survey: caribou observations

Data Sources
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Coordinate System: NAD 1983 UTM Zone 7N

Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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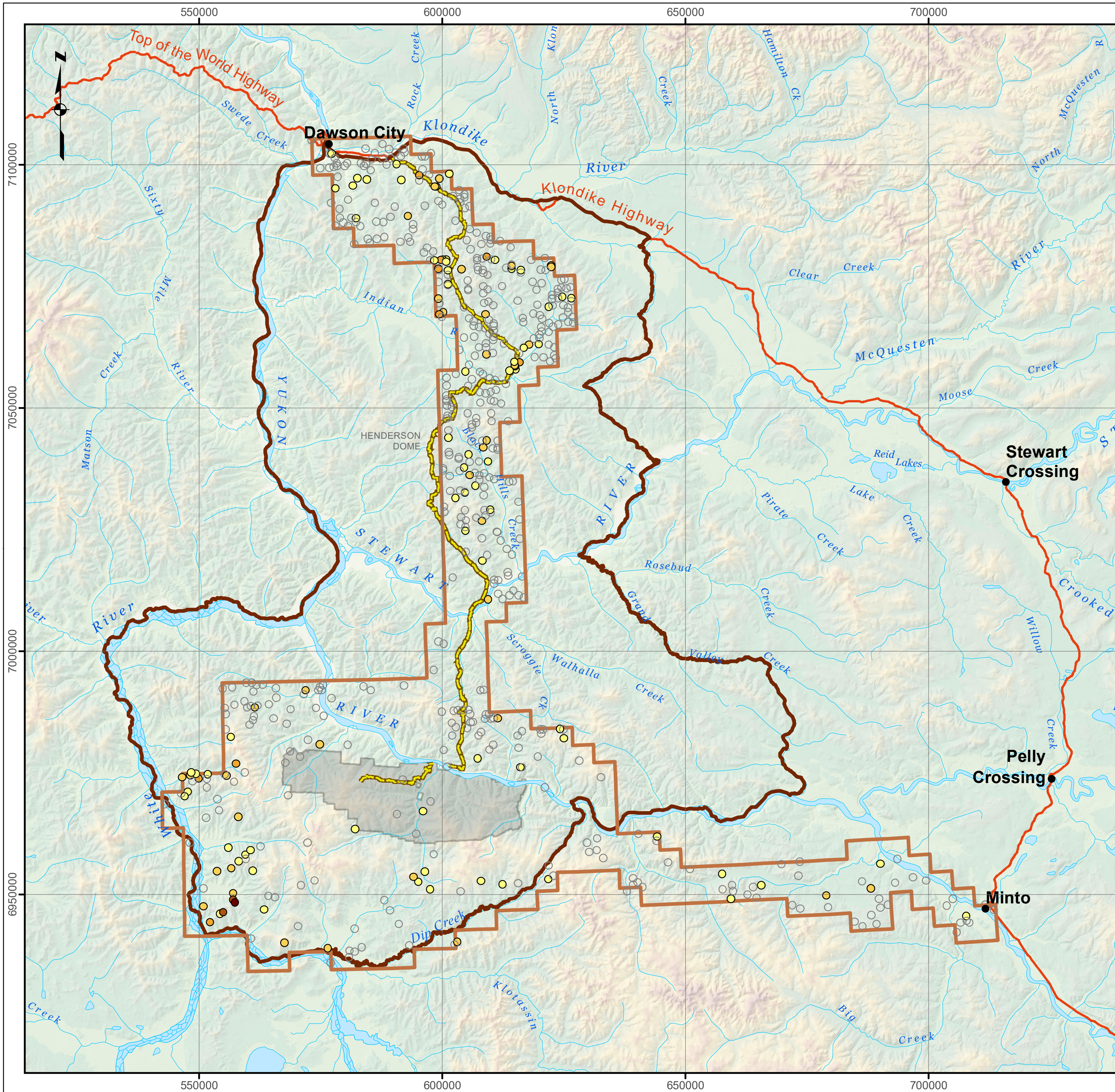

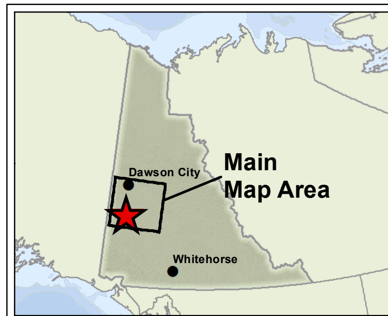

Legend

- Proposed Route
- Highway
- 2015 Late Winter Survey Extent
- Regional Study Area
- Coffee Property

Moose Observations (# of Individuals)

- 1
- 2
- 3
- 4
- 5
- Moose Tracks

FIGURE 3-6

2015 Late winter ungulate survey: moose observations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: HG/MP	Checked: AM/LP	Date: 2/24/2017

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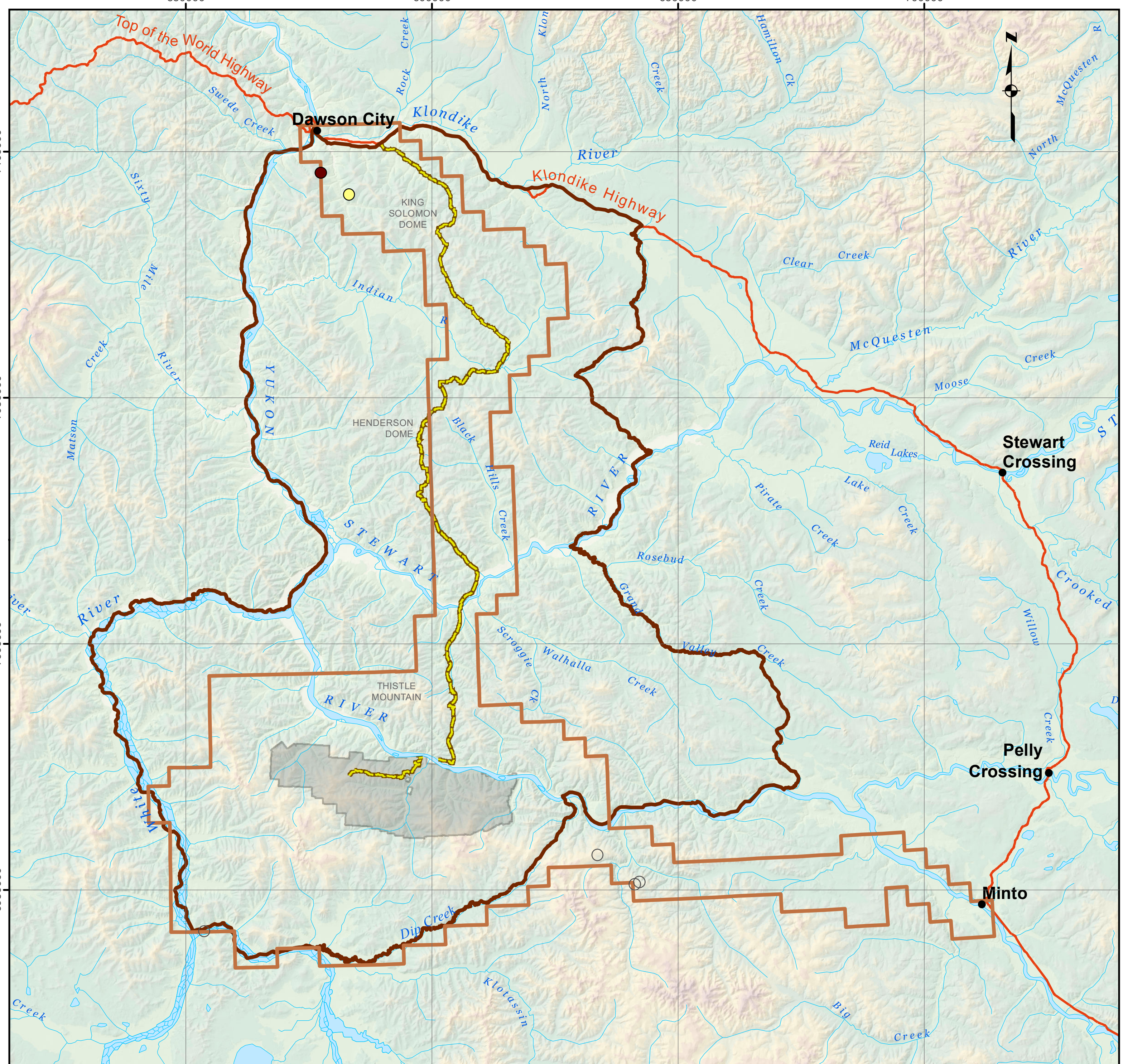

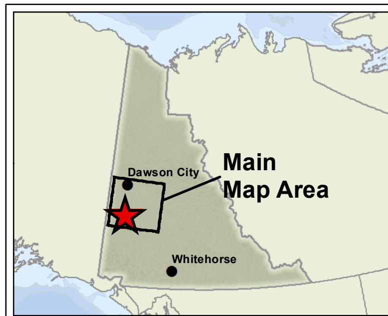

Legend

- Proposed Route
- 2015 Late Winter Survey Extent
- Regional Study Area
- Coffee Property
- Caribou Tracks

Caribou Observations (# of Individuals)

- 5
- 6-16

FIGURE 3-7

2015 Late winter ungulate survey: caribou observations

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0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

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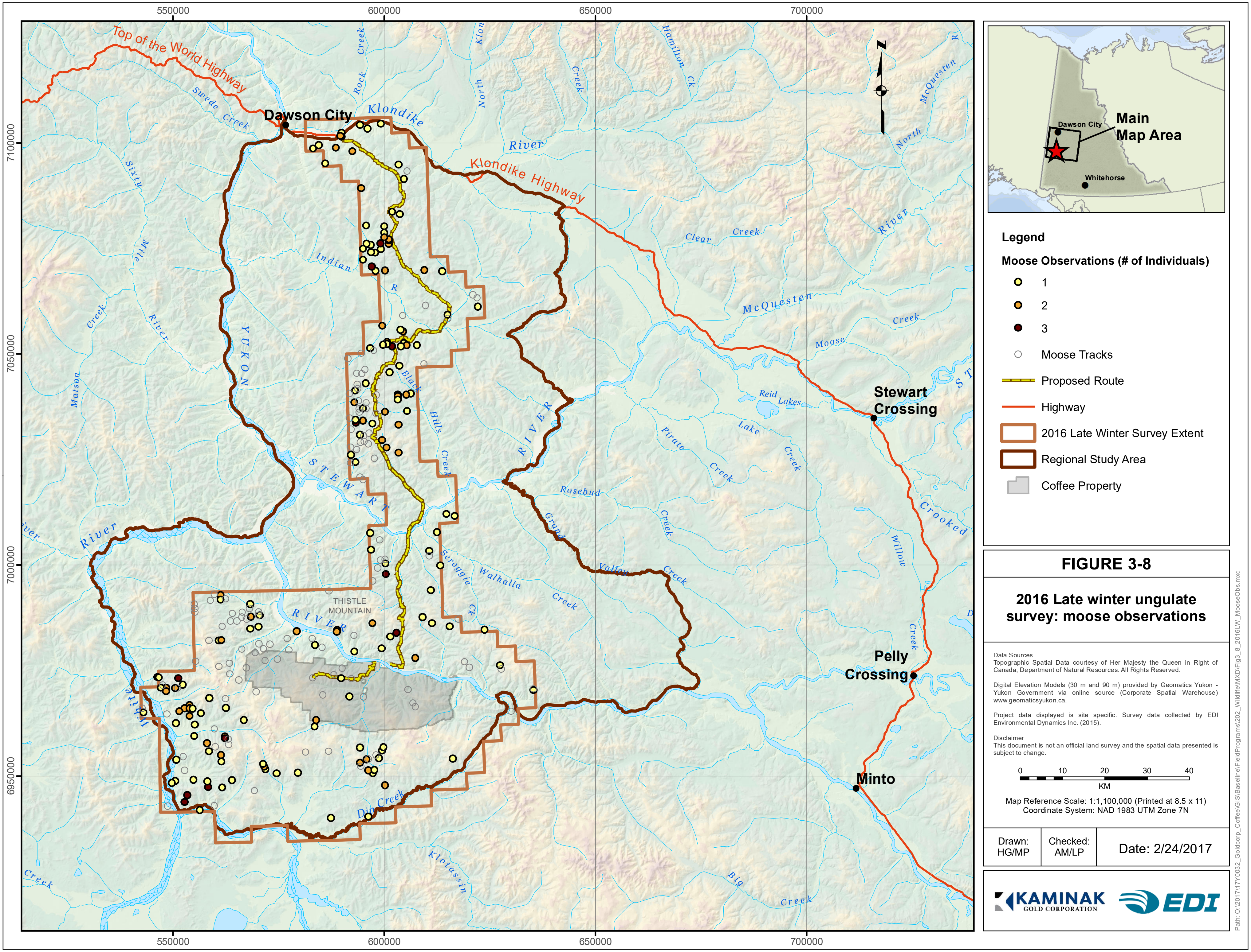

FIGURE 3-8

2016 Late winter ungulate survey: moose observations

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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2015).

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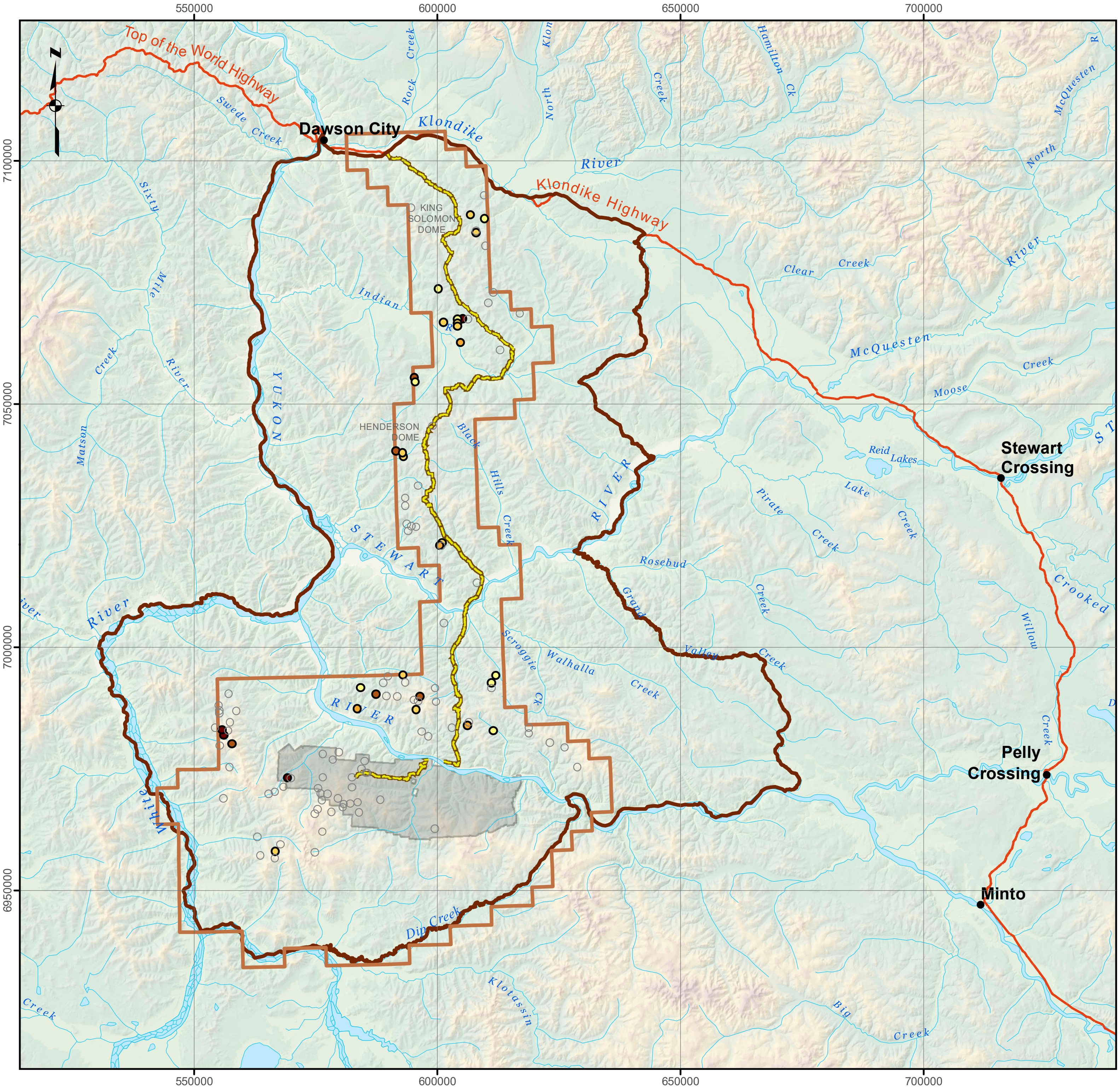

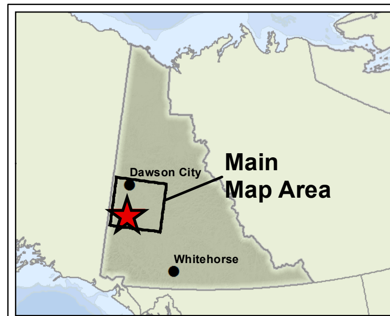

Legend

- Proposed Route
- Highway
- 2016 Late Winter Survey Extent
- Regional Study Area
- Coffee Property
- Caribou Tracks

Caribou Observations (# of Individuals)

- 1 - 2
- 3 - 6
- 7 - 11
- 12 - 22
- 23 - 40

FIGURE 3-9

2016 Late winter ungulate survey: caribou observations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2015).

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0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
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4 AERIAL THINHORN SHEEP SURVEYS

Prior to the commencement of Project baseline surveys, previous surveys by Environment Yukon had documented thinhorn sheep using the bluff habitat along the Yukon River within the RSA, and a Wildlife Key Area (WKA) for thinhorn sheep was established around the cliffs in the Ballarat Creek area. To increase knowledge on thinhorn sheep distribution and habitat use along the Yukon River within the RSA, Project baseline studies included five aerial surveys conducted along the cliffs on the north bank of the Yukon River between 2015 and 2016.

4.1 METHODS

All aerial thinhorn sheep surveys were conducted with a Bell 206 Jet Ranger, except the 2016 summer and 2016 early winter surveys which were conducted with a Eurocopter Astar AS350. Each survey was conducted by two EDI biologists sitting on the left side of the helicopter. Two to five passes were completed along each cliff face/exposed slope, typically starting at the west end of the survey extent working towards the east, unless otherwise noted. The first pass was conducted on the lower slopes and subsequent passes were conducted on the upper slopes. All sheep observations were recorded using a handheld GPS with as much detail as possible including location, time, number, sex and age. At the request of Environment Yukon, no specific locations of sheep observations have been provided in this report.

With the exception of the 2016 late winter survey, the aerial thinhorn sheep surveys were focussed on the bluffs along the north bank of the Yukon River within approximately 10 km of the Project footprint, including the Ballarat Creek WKA and the surrounding bluffs (the Focal Sheep Survey Extent in Figure 4-1). The 2016 late winter survey encompassed a larger area along the Yukon River to gain a better understanding of the regional sheep population (the Regional Sheep Survey Extent in Figure 4-1).

2015 Early Winter Survey

The 2015 early winter thinhorn sheep survey was conducted on November 22 by EDI biologists Lea Pigage and Brodie Smith. Survey conditions were good with overcast skies, minimal wind, and good visibility. The survey was conducted within the Focal Sheep Survey Extent within approximately 10 km to the east and west of Ballarat Creek (Figure 4-2). Two passes were made along the Yukon River, one low along the bluffs and the second along the same area but at a higher elevation to ensure full and even coverage of the survey area. Total survey effort was approximately 30 minutes.

2016 Late Winter Survey

The 2016 late winter thinhorn sheep survey was conducted on February 29, 2016 by EDI biologists Lee Hawkings and Graeme Pelchat. The survey focused on the White River, Ballarat Creek, and Pelly-Minto WKAs and connecting bluff habitat along the north bank of the Yukon River from the White River confluence to Minto Landing. Where potential sheep habitat occurred, several passes were made at different elevations to ensure full and even coverage of the survey area. Figure 4-3 shows the survey extent and flight lines. Survey conditions were ideal with light winds and high visibility for most of the survey. Low fog at the confluence of the Yukon and White rivers limited survey effectiveness in that area. Total survey time was approximately 3 hours.

2016 Lambing Survey

The 2016 lambing thinhorn sheep survey was conducted on May 25, 2016 by EDI biologists Brodie Smith and Jolene Lust. Survey conditions were good with partly cloudy skies, minimal wind and good visibility. Similar to the 2015 late winter thinhorn sheep survey, this survey was concentrated along the bluffs on the north bank of the Yukon River for approximately 10 km to the east and west of Ballarat Creek (Focal Sheep Survey Extent in Figure 4-1). A total of four passes were made through the survey area (Figure 4-4). In recognition that the sheep may be especially sensitive to disturbance during the lambing period, the first pass was high, moving east to west along the bluffs, allowing the observers to get an overview of the area without being too close to any potential sheep groups. Once the locations of the sheep were roughly determined the second pass was flown west to east along the upper portions of the bluffs, and the fourth pass was flown west to east along the lower portions of the bluffs. Areas identified as having sheep were avoided on the closer passes. The third pass was flown east to west along the hills to the north of the Yukon River bluffs. Additionally, two passes were made along the bluffs at Coffee Creek to survey for potential sheep activity. Total survey effort was approximately one hour.

2016 Summer Survey

The 2016 summer survey was completed on June 13, 2016, in conjunction with the cliff-nesting raptor survey, by EDI biologists Todd Mahon and Lee Hawkings. The survey was conducted approximately 10 km to the west and 10 km to the east of Ballarat Creek. Weather conditions for the survey were good with partly cloudy skies, light winds and good visibility; the temperature at the time of the survey was approximately 15°C. Between two and four passes were made of each bluff area, depending on terrain (Figure 4-5).

2016 Early Winter Survey

The 2016 early winter survey was completed on October 24, 2016 by EDI biologists Brodie Smith and Dawn Hansen. Weather conditions were good with clear skies, no wind and cold temperatures (-22°C). The survey area was similar to the 2015 early winter survey, extending approximately 10 km to the east and west of Ballarat Creek. Five passes were made of the south-facing slopes along the Yukon River, starting at the south-eastern end and flying west-ward. Total survey time was one hour, nineteen minutes.

4.2 RESULTS

Note: At the request of Environment Yukon, no specific locations of sheep observations have been provided in this report.

2015 Early Winter Survey

Three ewes and one unclassified sheep were observed west of Ballarat Creek, within the Ballarat Creek WKA, during the early winter survey. The sheep were located in sparsely forested, rocky habitats near the top of the bluff. Four mule deer were also observed during the survey, downslope of the sheep. Tracks were observed on a number of ridges near Ballarat Creek indicating use by either sheep or deer, or both. The survey flight line is shown in Figure 4-2.

2016 Late Winter Survey

Five thinhorn sheep were observed near the Yukon-White River confluence within the WKA. More sheep are suspected but survey effort in this area was limited by low fog and poor visibility. Between the Yukon-Pelly River confluence and Minto, 102 thinhorn sheep were observed. All sheep observed were within the WKA and no sheep or sheep sign were observed outside of the WKA in this area. No sheep or sheep tracks were observed within the Ballarat Creek WKA, although possible sheep tracks were observed on slopes to the west of the WKA. No sheep or sheep tracks were observed along the Yukon River bluffs in any other location. Survey flight lines are shown in Figure 4-3.

Other tracks, including many old caribou and moose tracks, were seen throughout the survey area. Fresh tracks, likely from mule deer, were observed east of Ballarat Creek and west of the Pelly River.

2016 Lambing Survey

Four thinhorn sheep were observed on a bluff to the east of Ballarat Creek during the first pass along the lower slopes. The sheep were located near the top of the bluff and moved into the trees above the bluff in response to the helicopter. One thinhorn sheep was observed on the same bluff during the fourth pass; however, it was observed directly below where the original group was observed and was likely part of this group. No lambs were observed. The survey flight line is shown in Figure 4-4.

2016 Summer Survey

No sheep were observed during the 2016 summer aerial thinhorn sheep survey. The survey flight line is shown in Figure 4-5. However, following the survey completion a group of four thinhorn sheep (three ewes, one possible yearling) were observed incidentally east of Ballarat Creek while accessing the area for Ground Based Sheep Investigations (Section 5). The sheep were observed mid-slope on a sparsely forested broken cliff.

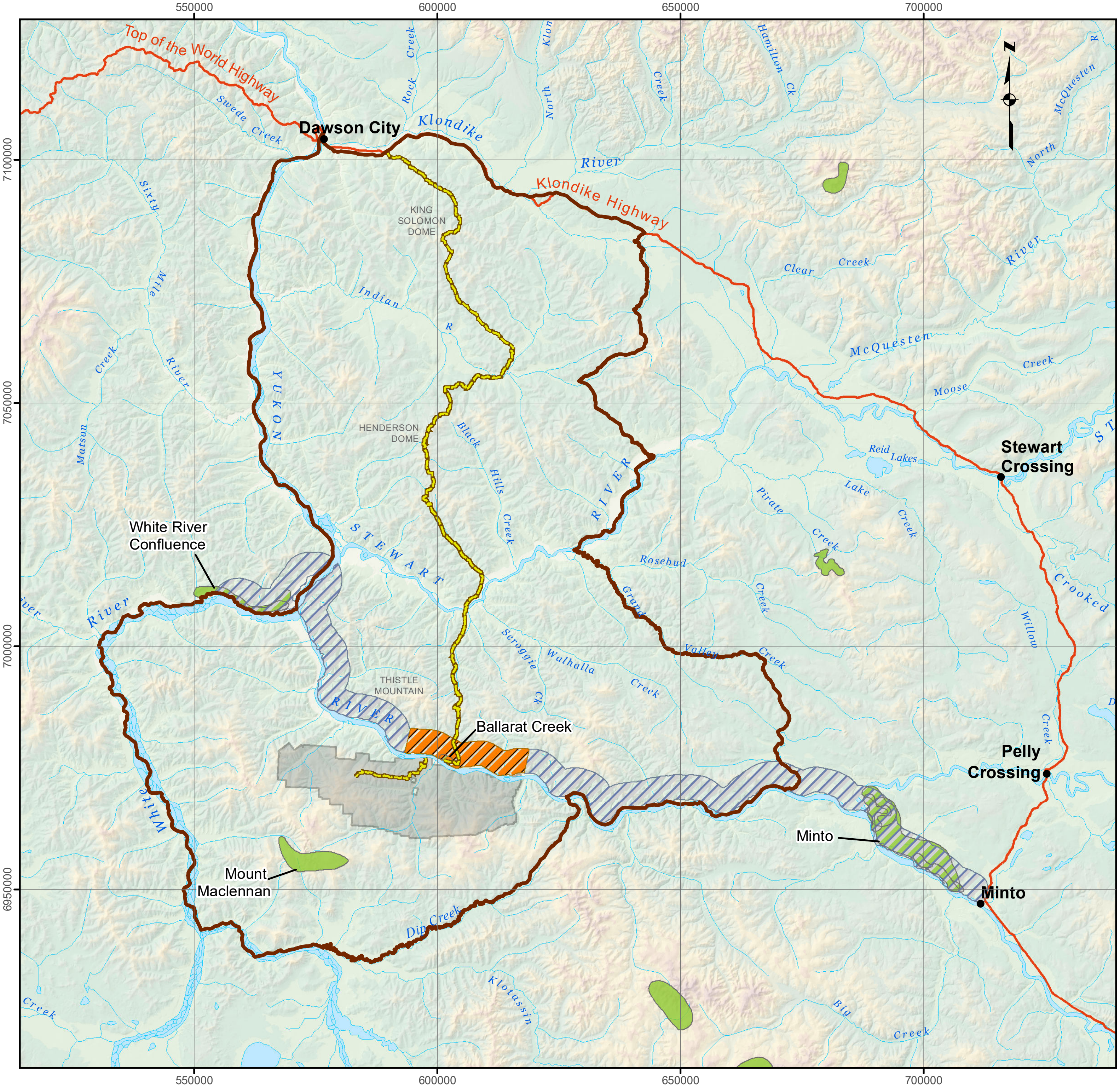
2016 Early Winter Survey

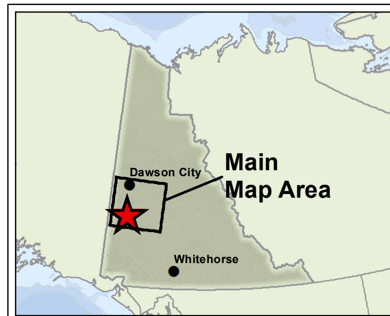
Four nursery sheep were observed during the second pass of the early winter surveys. They were located mid-slope just below a rocky outcrop on one of the bluff complexes to the west of Ballarat Creek, within the Ballarat Creek WKA. In response to the helicopter, the sheep moved upslope into terrain were they could no longer be observed. The survey flight line is shown in Figure 4-6.

Other Surveys

In addition to those aerial sheep surveys described here, surveys were conducted for cliff nesting raptors in June 2014, April 2015 and June 2015 in the same areas as the surveys conducted in the Ballarat Creek area using similar methods to the sheep survey. Four nursery sheep were observed during the June 2014 survey on a bluff east of Ballarat Creek. No sheep were observed during the April 2015 or June 2015 surveys.

An aerial survey using infrared camera was also conducted along the Yukon River bluffs near Ballarat Creek in April 2016. This method uses an infrared camera mounted outside the airplane to detect the heat signature of animals, including sheep. Unfortunately, survey methods were deemed not suitable for this application and no sheep were detected.





Legend

- Proposed Route
- Highway
- Focal Sheep Survey Extent
- Regional Sheep Survey Extent
- Thinhorn Sheep Wildlife Key Areas
- Regional Study Area
- Coffee Property

FIGURE 4-1

Regional sheep survey extent

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2015 & 2016).

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

0 10 20 30 40
KM

Map Reference Scale: 1:1,100,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

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Figure 4-2. 2015 Early winter sheep survey

Figure 4-2: 2015 Early Winter Sheep Survey is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

Figure 4-3. 2016 Late winter sheep survey

Figure 4-3: 2016 Late Winter Sheep Survey is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

Figure 4-4. 2016 Spring lambing survey

Figure 4-4: 2016 Spring Lambing Survey is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

Figure 4-5. 2016 Summer sheep survey

Figure 4-5: 2016 Summer Sheep Survey is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

Figure 4-6. 2016 Early winter sheep survey

Figure 4-6: 2016 Early Winter Sheep Survey is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

5 GROUND BASED SHEEP INVESTIGATIONS

The steep bluffs on the north bank of the Yukon River near Ballarat Creek are known sheep habitat. To gain a better understanding of sheep distribution, habitat use and movement through this area, several ground based surveys were conducted including a visual sheep monitoring program conducted by the Kaminak Environmental Monitors (EMs) during the summer of 2015 (Section 5.1), sheep trail investigations in 2015 and 2016 (Section 5.2) and remote camera studies (Section 8.1). A particular focus for the ground based sheep surveys was investigating the timing and location of sheep movements across the Ballarat valley. Based on sheep observations along the Yukon River bluffs, movement across the Ballarat Creek valley is assumed to occur and gaining a better understanding of these crossings is a priority for Project planning as the proposed NAR alignment follows existing roads through the Ballarat Creek valley.

5.1 VISUAL SHEEP MONITORING

5.1.1 METHODS

Kaminak EMs conducted regular ground based visual sheep surveys of the slopes north of the Yukon River between May 27, 2015 and August 28, 2015 to document sheep use of the area. Surveys were conducted at two different locations near Coffee Camp to increase sightability. When possible, the slopes in the vicinity of Ballarat Creek were also surveyed from the Ballarat airstrip. A spotting scope was used to systematically scan the hills for a minimum of 10 minutes per visit. All wildlife observed during the surveys were recorded.

5.1.2 RESULTS

No sheep were observed during the ground based visual surveys despite over seven hours of survey effort throughout the summer of 2015. Based on sheep observations made during the aerial thinhorn sheep surveys (Section 4) and in incidental observations (Section 13.4) it appears that the thinhorn sheep are concentrating their use of these bluffs between mid- and upper-slope. Due to geographic relief, the ground based visual surveys from Coffee Camp and the Ballarat airstrip provided a suitable means of surveying the lower- to mid-slope sections of the bluffs but had less visibility of the mid- to upper slopes. Due to the lack of sheep observations made during the 2015 visual surveys and the challenges in viewing the mid- to upper slope areas, the program was discontinued in 2016.

5.2 BALLARAT CREEK SHEEP TRAIL INVESTIGATIONS

5.2.1 METHODS

2015 Sheep Trail Investigations

Ground investigations in the Ballarat Creek valley were conducted by EDI biologists Anne MacLeod and Lee Hawkings and the Kaminak EMs on May 29, 2015 and August 4, 2015. Efforts were focused on finding trails coming down off the slopes to the east and west of Ballarat Creek that may be used by thinhorn sheep during movements through the area. These surveys were done in conjunction with remote camera studies and five Reconyx PC900 Hyperfire cameras were set up along wildlife trails in this area to monitor for sheep and other wildlife use (refer to Section 8.1 for more information on the remote camera studies).

2016 Sheep Trail Investigations

Expanding on the 2015 sheep trail investigations, more extensive ground based trail investigations were completed in June 2016 and October 2016 to further document potential movement corridors and high use habitat areas. Ground investigations were conducted by EDI biologists Todd Mahon and Lee Hawkings and Kaminak EMs on June 14–17, 2016 and by EDI biologists Brodie Smith and Dawn Hansen and Goldcorp's Environmental Superintendent Jasmin Dobson October 25 and 26, 2016. The investigations were focused on finding trails leading up/down the slopes into the Ballarat Creek valley and along the ridge tops identified as having the best potential for sheep foraging and escape terrain. Effort was also made to access trails along the steep mid-slope sections of the Yukon River bluffs. Investigations were completed by hiking and noting signs of wildlife use such as trails, tracks and pellet groups.

During the June 2016 survey, all ridge tops up to 10 km west of Ballarat Creek were surveyed. One accessible mid-slope area was also surveyed on foot and several mid-slope wildlife trails west of Ballarat Creek were identified from the helicopter but were not surveyed on foot due to lack of helicopter landing sites. In addition to the ridge tops and mid-slopes, the lower toe of the slope immediately west of Ballarat Creek along the proposed NAR alignment was investigated. Ground surveys to the east of Ballarat Creek were limited to the slope leading up from Ballarat Creek. Three other areas of suitable habitat were present east of Ballarat Creek; however, these habitats were not surveyed on the ground due to rugged terrain and an absence of helicopter landing sites.

During the October 2016 survey, a section of ridge west of Ballarat Creek that had been identified as having wildlife trails and sheep sign during the June 2016 survey was re-visited. Four remote cameras were installed along the ridge top trail west of Ballarat Creek, and were placed in locations identified as high wildlife use areas during the June surveys. Ridge trails were investigated for fall/winter use by wildlife. Ground based and aerial investigations of ridge lines further north of the Yukon River up Ballarat Creek were also conducted. The road from the Ballarat Creek airstrip was surveyed up to approximately 2 km north of the airstrip for signs of wildlife and sheep trails crossing the road.

In addition to providing information on sheep habitat use and movement in the Project area, these ground investigations also allowed biologists to ground truth the sheep habitat suitability model described in further detail in the report *Coffee Gold Project: Thinhorn Sheep Habitat Suitability Report* (EDI 2016a).

5.2.2 RESULTS

2015 Sheep Trail Investigations

During the 2015 ground investigations, well-used wildlife trails were identified along the bottom of the Ballarat Creek valley, most of which ran parallel to Ballarat Creek. Lightly used trails were identified leading up the ridgelines on both the west and east side of the creek. These trails were documented by GPS and remote cameras were set up along the trails. Moose sign (i.e. tracks, pellets) was abundant along all wildlife trails observed; no sign of sheep use was observed.

The remote cameras set up within the Ballarat Creek valley have not captured any thinhorn sheep to date (as of October 2016) although other species including caribou, moose, mule deer, grizzly bear, black bear, grey wolf, lynx, porcupine (*Erethizon dorsatum*), American marten (*Martes americana*), weasel (*Mustela* sp.), snowshoe hare (*Lepus americanus*), and red squirrel (*Tamiasciurus hudsonicus*) have been photographed. Based on the camera results, it is hypothesized that the well-used wildlife trails in the Ballarat Creek valley that parallel the creek are from other species, although they may occasionally be used by sheep. Further details on the remote cameras in the Ballarat area are described in Section 8.1.

2016 Sheep Trail Investigations

During the June 2016 sheep trail investigations, wildlife trails were identified coming down the west Ballarat Creek bluffs; however, these trails appear to be used by many species and are not sheep specific. Level of use varied along the ridge. Two areas were identified where there was evidence of concentrated use by sheep including numerous pellet groups, bedsites and disturbed ground leading into escape terrain and forage habitat. Low levels of sheep sign occurred intermittently along the ridge. No evidence of sheep use was observed along the toe of the slope west of Ballarat where the proposed NAR alignment runs along the based on the slope. An intermittent wildlife trail was identified on the ridge east of Ballarat Creek but no sheep sign was observed. Four sheep (three ewes and one possible yearling) were observed incidentally while trying to access sites for the ground survey from helicopter. The sheep were observed east of Ballarat Creek mid-slope on one of the bluff complexes that was inaccessible by helicopter.

During the October 2016 sheep trail investigations, fall/winter use of the wildlife ridge trails west of Ballarat Creek was verified through observations of tracks found along the trail; however, fresh snow made it difficult to identify the tracks and level of use in most places. The wildlife trails along the ridge were well defined. One site identified in the June surveys had fresh evidence of sheep use including numerous pellet groups, bedsites, disturbed ground, and hair on trees. The investigations of ridges further north of the Yukon River up Ballarat Creek resulted in no new evidence of sheep trails crossing the valley; however, fresh snow may have covered any sign that was visible before snowfall.

Ground surveys were focussed on the ridges above areas of potential escape terrain and foraging habitat partly because those areas can receive concentrated use by sheep and partly because those were the only areas that were accessible and safe for ground surveys. Observations from ground and aerial surveys indicate that sheep may be using mid-slope areas within, between, and below escape terrain more extensively than the ridge tops.

Figure 5-1. 2015/2016 Ground based sheep survey results

Figure 5-1: 2015/2016 Ground Based Sheep Survey Results is not provided in the publicly available version of the Coffee Gold Mine: Wildlife Field Programs Report due to the sensitive nature of the data.

6 GRIZZLY BEAR DEN SURVEYS

Grizzly bears hibernate in dens which are often excavated into alpine or subalpine slopes. Grizzly bear den emergence surveys (den surveys) were conducted in 2016 to determine areas where grizzly bear denning occurs and the number of active dens within close proximity to proposed Project infrastructure (both road and mine site).

6.1 METHODS

Den surveys were conducted on March 21, March 31, April 22, and May 06 by EDI biologists Dawn Hansen (participated in all surveys), Lea Pigage, Lee Hawkings, Brodie Smith and Brett Pagacz. Den surveys were conducted in suitable habitat within a 2 km buffer along the NAR and within a 5 km buffer surrounding the proposed mine site (Figure 6-1).

A grizzly bear denning habitat suitability model was created for the entire RSA (EDI 2016b). The model was used to identify the most suitable areas for grizzly bear denning to occur. A six class rating system was used to classify suitable denning habitat with a rating of 0 being highly unsuitable denning habitat and a rating of 6 being the most suitable habitat in the area. Characteristics used to develop this model included slope, aspect, and elevation. Methods used to develop the grizzly bear denning model are described in further detail in the report *Coffee Gold Mine: Grizzly Bear Habitat Model Report* (EDI 2016b).

Surveys were conducted by flying through the areas that were modeled as having moderate to high habitat (Class 4, 5, or 6) as well as along south facing slope above the Yukon River, Stewart River and Indian River that have had reports of bears denning in previous years. Both observers were located on the same side of the aircraft and would thoroughly search an area by flying multiple passes at varying elevations within a modeled area. Surveyors were looking for any indication of bear presence including tracks, porches, recent digging, dens as well as bears. If bear tracks were located, surveyors would determine the direction of travel and then followed the tracks back to the den site. If a den was located surveyors would record GPS location, den characteristics (excavated, cave, root wad etc.), bear presence, species, and general habitat characteristics (slope position, aspect, vegetation cover etc.).

The March 21, 2016 survey was completed by helicopter (Bell 206L) with Trans North (pilot Nick Falloon); however, all remaining surveys were completed by fixed-wing with Alpine Aviation (pilot Gerd Mannsperger) due to the relatively moderate landscape. The weather for the March 21 survey was near ideal — limited cloud cover and very light winds. The Yukon and Stewart rivers valleys had low lying fog when the crew first arrived in the survey area, so the survey first focused on the NAR flying north and these river valleys were completed later in the day when the fog had cleared.

March 31 survey was completed with ideal weather conditions, no wind, warm temperatures, and a mix of sun and cloud with excellent visibility. Snow conditions had deteriorated from the previous survey due to the unusually warm temperatures and lack of precipitation.

During the April 22 survey, snow conditions had further deteriorated and the area was mostly snowfree excluding north facing slopes and high elevation areas which exhibited increased snowpack over the winter. Weather conditions were suitable for surveys although not ideal and were frequently changing. The survey was mostly overcast, with periods of heavy snowfall and low clouds. Wind varied throughout the survey from light to heavy and visibility ranged from excellent to poor. Weather conditions worsened near Dawson while conditions surrounding the proposed mine site were good.

May 6 was the last denning survey and weather conditions were good for conducting surveys with warm temperatures and mix of overcast and sun. The winds were variable throughout the survey ranging from light to high. Most of the area was snow free, although some sections still had some snow present in patches.

6.2 RESULTS

Conditions for the 2016 den surveys were less than ideal with many factors limiting the ability for observers to detect bear den presence: low snow pack and no recent fresh snow; use of the area by Fortymile caribou which resulted in extensive tracks throughout the survey area; and snow melt already having rapidly occurred. Active bear dens are often located by finding recent bear tracks and then following them backwards to the den. Tracking conditions were very poor since most of the suitable denning habitat is heavily used by the caribou and moose and no recent snowfalls had occurred — making tracking bears difficult. At the start of the 2016 den surveys (March 21), many of the south facing slopes had already lost a considerable amount of snow, particularly along the Yukon, Stewart and Indian rivers (Photo 6-1 and 6-2).

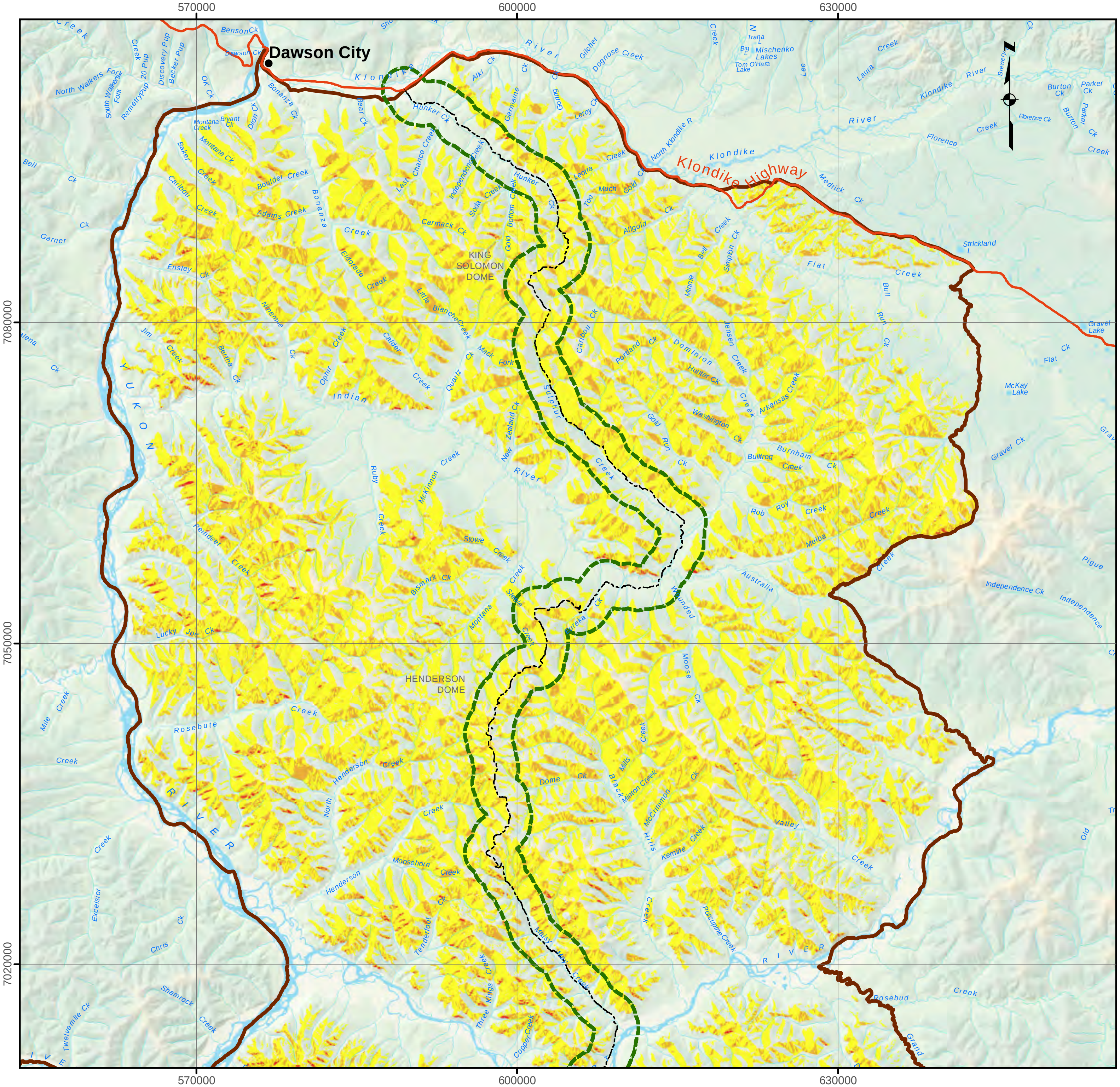
No bears or bear sign were observed during the first (March 21, 2016) or second surveys (March 31, 2016). During the second survey, snow conditions had dramatically declined from the previous survey due to un-seasonally warm temperatures. During the third survey (April 22, 2016) a black bear was observed along a south facing slope with fresh greenery and four suspected black bear dens were located (three excavated into the side of south facing slopes, one in a cave in a rocky outcrop). Tracking conditions were very poor since the majority of the snowpack was gone and denning habitat was still heavily tracked by the caribou and moose during the winter months. The south facing slopes were snow free and were starting to green-up. During last survey (May 6, 2016) four black bears were observed within the survey extent along the NAR. Just outside of the 2 km buffer along the south facing bluffs on the Stewart River a suspected black bear den was located excavated into the slope. The location of the bears and bear dens observed during the 2016 den surveys is shown on Figure 6-2. Other incidental wildlife observations made during the denning surveys included a group of 12 caribou observed during the March 21 survey, nine moose observed throughout the four surveys, and a pair of red-tailed hawks (*Buteo jamaicensis*) observed on the May 6 survey.

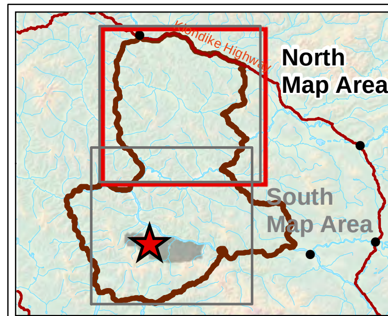
Areas that were classified as having higher denning potential in the denning model (i.e. classes 4, 5 &6) were thoroughly surveyed during the 2016 denning surveys. Although a "6" was considered to have the most suitable denning potential, this habitat was limited. There was very little high quality denning habitat identified within the model and the identified habitat was discontinuous throughout the RSA.

Review of the remote camera data (Section 8) for the 2016 den survey period suggests that the timing of the surveys was appropriate for capturing den emergence. More than 20 remote cameras were active within the RSA during the den survey period. No bears were observed on any cameras prior to April 13. However, between April 13 and May 6, nearly half of the active remote cameras photographed bears including cameras in both the northern and southern portions of the RSA. The first grizzly bear photographed in 2016 was captured on April 13 in the Ballarat area. A grizzly bear was also photographed in the Ballarat area on April 14 and April 26; however, these photos are suspected to all be of the same bear. A grizzly sow and cub were photographed in the Barker Creek area on April 29. The first black bear photographed in 2016 was observed on April 23 in the Ballarat area; cameras in the Coffee Creek, Barker Creek, Maisy May Creek, and Indian River areas also had black bear observations during the last week of April.

Photo 6-1. Snow conditions at the start of the 2016 den surveys

Photo 6-2. Snow conditions at the start of the 2016 den surveys





Legend

- Highway
- Proposed Route
- Grizzly Bear Survey Extent
- Regional Study Area

Grizzly Bear Denning Suitability

- Moderate
- Moderate/High
- High

FIGURE: 6-1a

Grizzly bear den surveys:survey extent

Data Sources
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Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Suitability model created by EDI Environmental Dynamics Inc. (2016).

Disclaimer
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Coordinate System: NAD 1983 UTM Zone 7N

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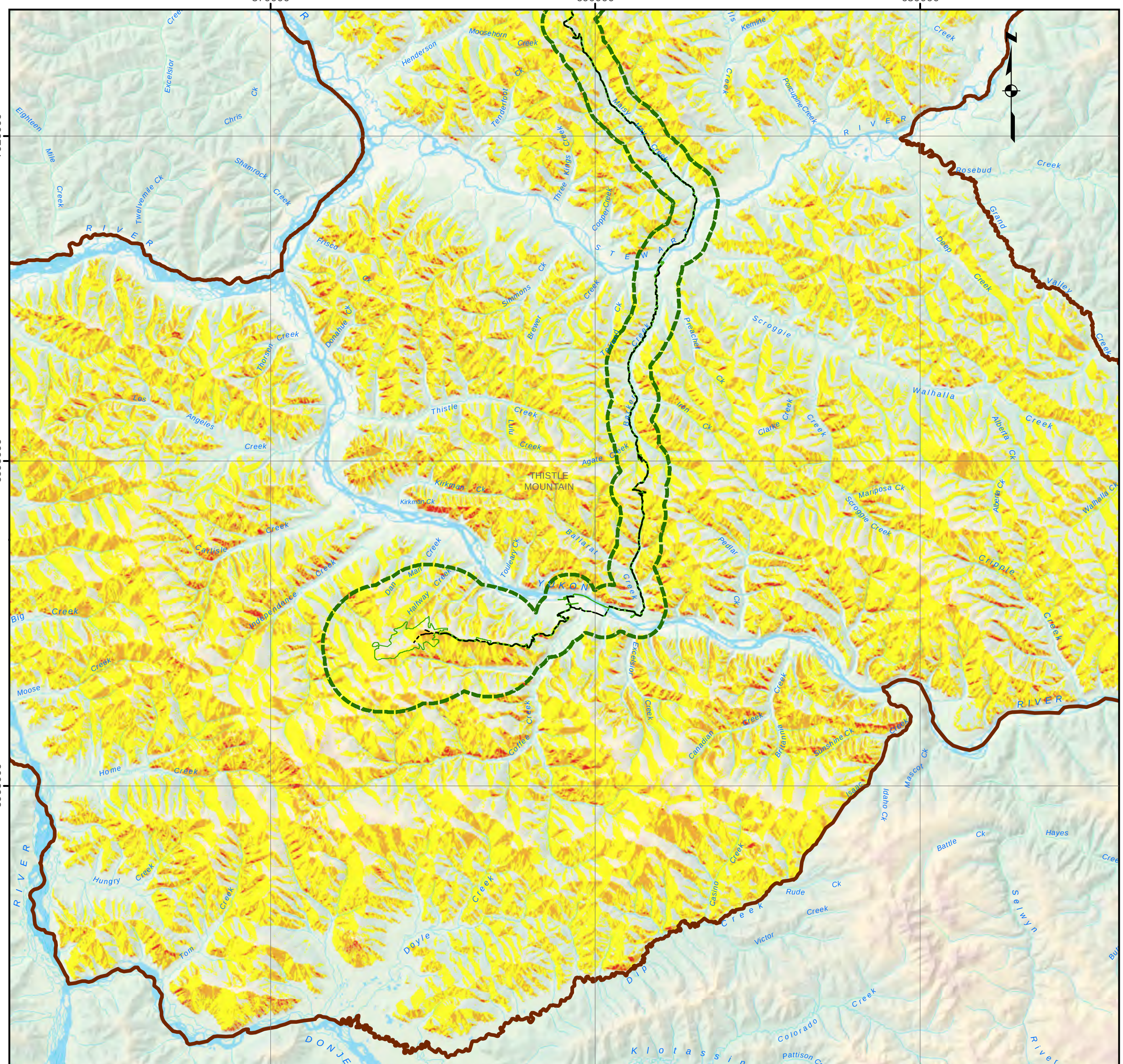

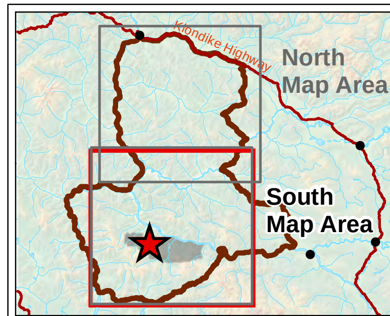

Legend

- Highway
- Proposed Route
- Grizzly Bear Survey Extent
- Regional Study Area
- Mine Site Footprint

Grizzly Bear Denning Suitability

- Moderate
- Moderate/High
- High

FIGURE: 6-1b

Grizzly bear den surveys:survey extent

Data Sources
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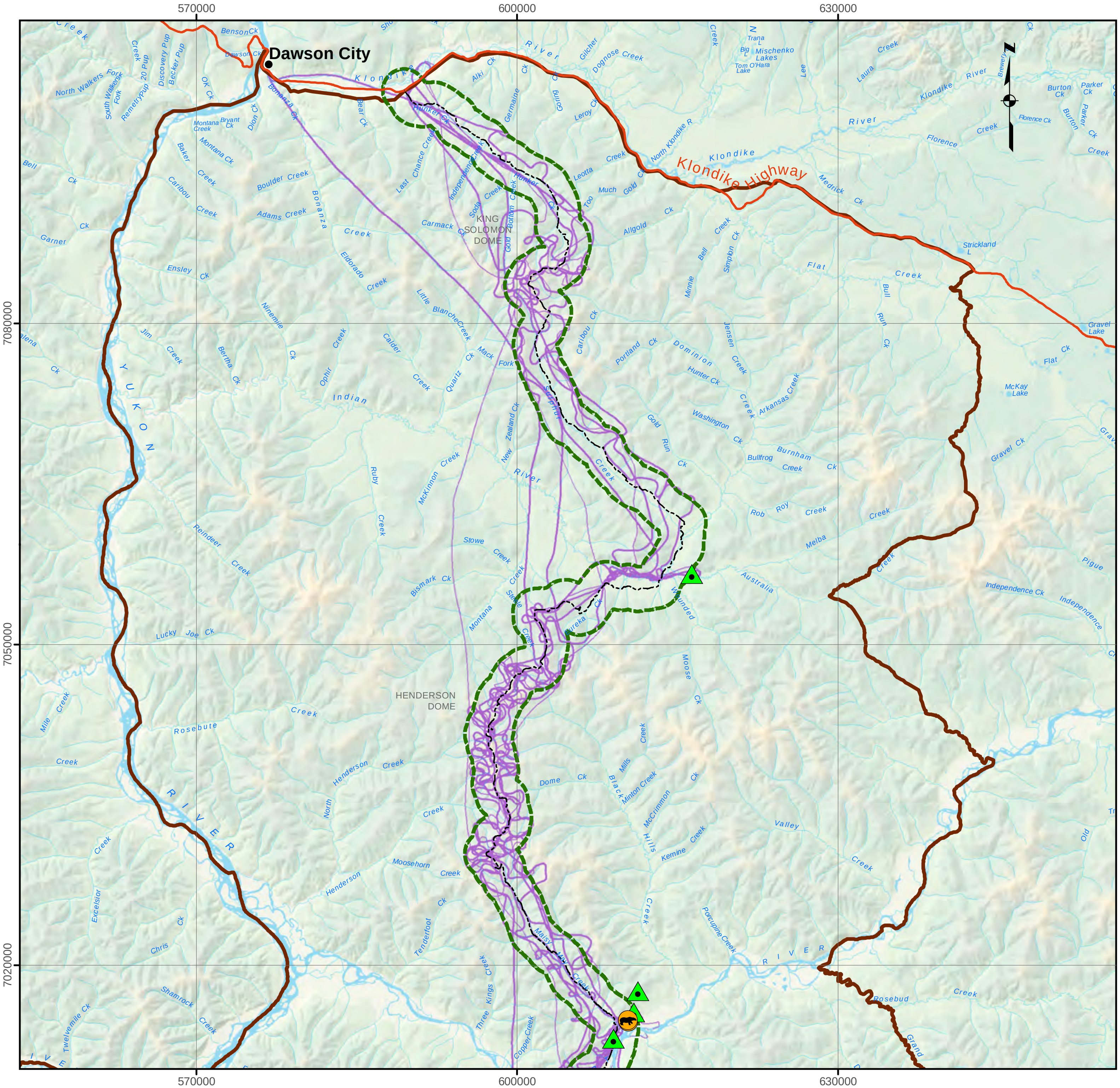

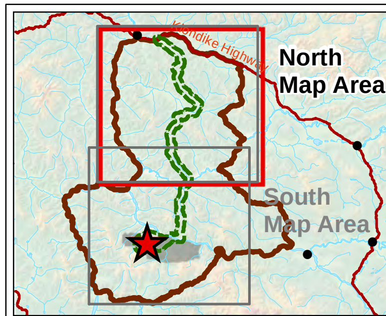

Legend

- Highway
- Proposed Route
- Grizzly Bear Den Survey Flightline
- Grizzly Bear Survey Extent
- Regional Study Area

Black Bear Observations

- Black Bear Sighting
- Potential Black Bear Den

FIGURE: 6-2a

Grizzly bear den surveys: flightlines and bear observations

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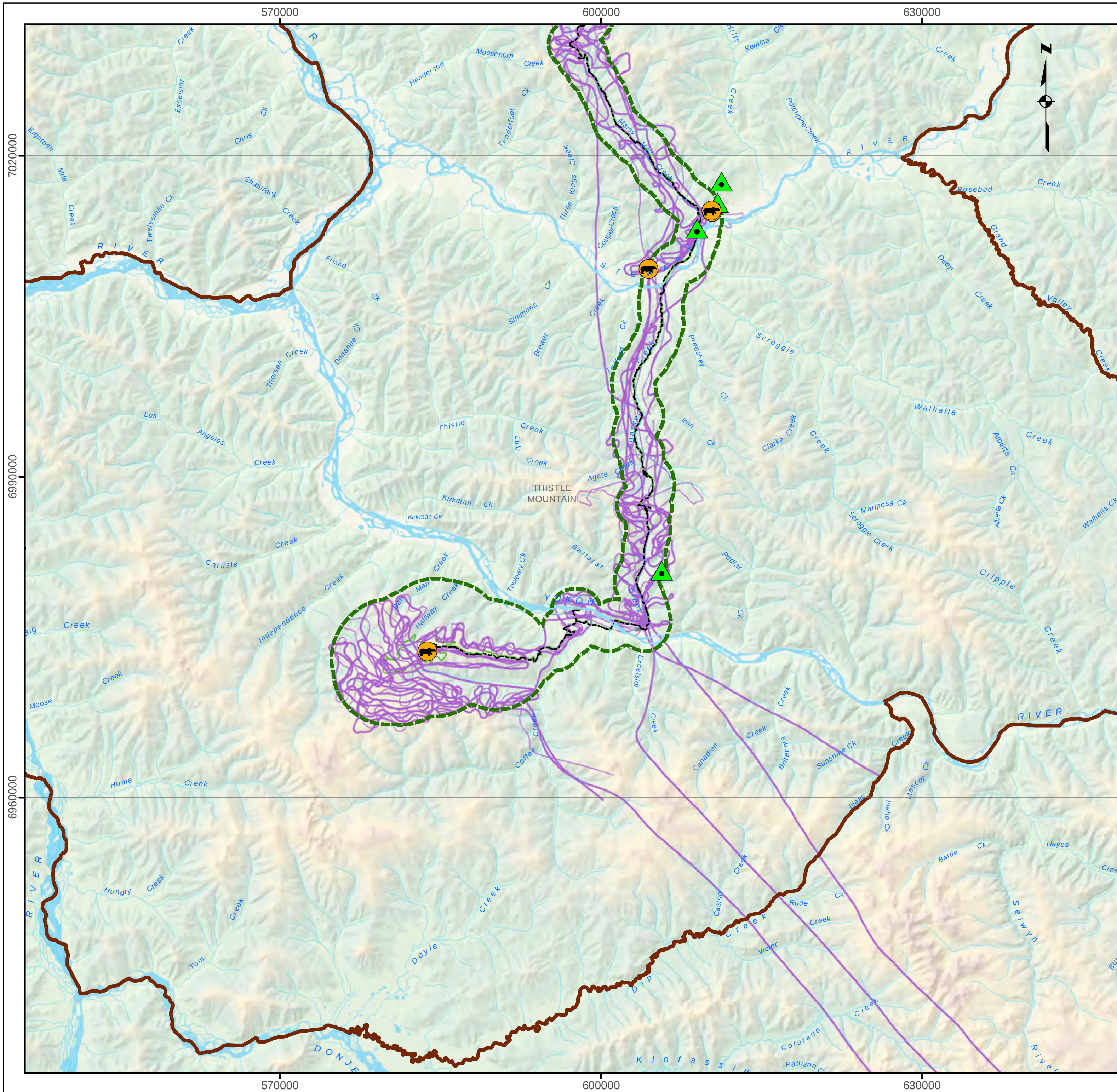

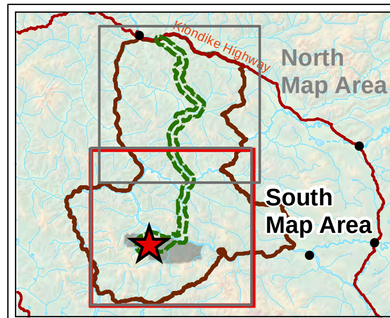

Legend

- Highway
- Proposed Route
- Grizzly Bear Den Survey Flightline
- Grizzly Bear Survey Extent
- Regional Study Area
- Mine Site Footprint

Black Bear Observations

- Black Bear Sighting
- Potential Black Bear Den

FIGURE: 6-2b

Grizzly bear den surveys: flightlines and bear observations

Data Sources
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7 SNOW TRACK SURVEYS

Wildlife snow tracking surveys were conducted to fill data gaps on the presence and winter distribution of furbearers and ungulates. Snow tracking surveys were focused in areas where potential wildlife interactions may occur with Project infrastructure (i.e. proposed mine site and access routes).

7.1 COFFEE PROPERTY – 2015

7.1.1 METHODS

Snow tracking surveys of the Coffee Property were conducted from February 11–15, 2015. Surveys were based out of Coffee Camp. Drilling activity was ongoing at the time of the survey and the Java Road (i.e., the road running from the current barge landing on the Yukon River to the proposed mine site) was maintained (i.e. snow was cleared). Snow tracking surveys were conducted on foot, accessing snow track plots by truck. Thirty snow track plots were completed near the mine site, camp and along the Java road (Figure 7-1). Each plot was an equilateral triangle with 250 m sides (i.e. transects), for a total transect length of 750 m. Biologists recorded the number of fresh tracks observed and occurrence of old animal tracks along each transect. Snow depth was estimated at eight locations within the survey extent. Average snow depth was 45 cm with snow depths ranging from 15 to 70 cm; however, snow was quite shallow along the Yukon River (approximately 25 cm).

7.1.2 RESULTS

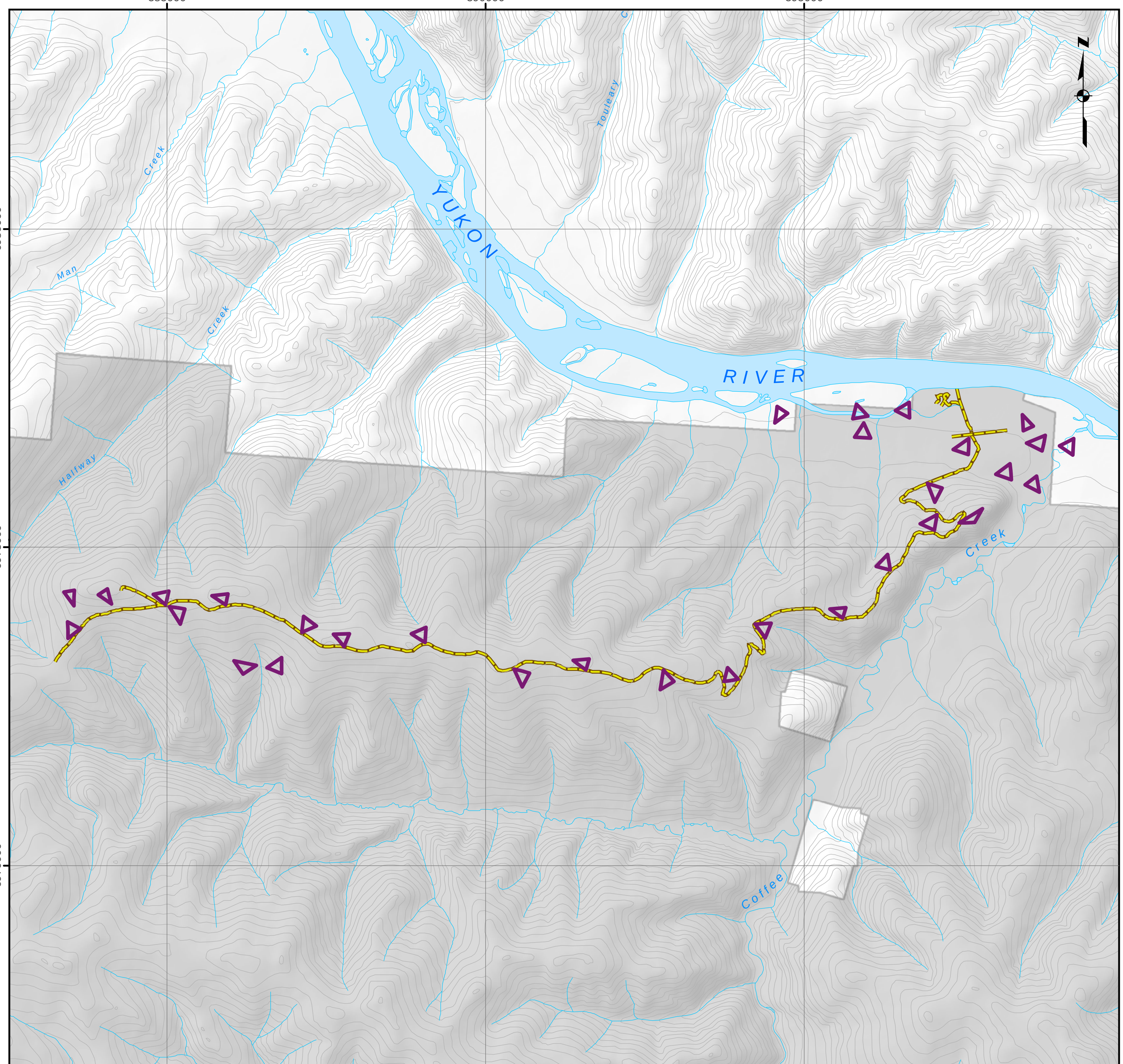
Species detected during the survey included moose, wolf, wolverine (though not on transects), lynx, snowshoe hare, American marten and a small weasel (Table 7-1). Tracks from moose, wolf and American marten were recorded in the vicinity of the proposed mine site.

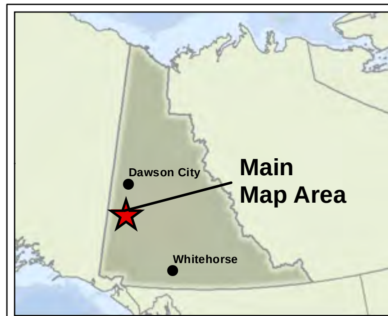
Wildlife species were not distributed evenly across the survey extent. Wolf tracks were observed along Coffee Creek, the Yukon River, and along the lower elevation sections of the Java Road. Moose were mostly observed using the mid to upper forested habitat (boreal-high), and into the subalpine. Moose were rarely detected in the lower elevation habitats. Marten were most abundant in the subalpine, and less frequently observed below treeline. Lynx and snowshoe hare were exclusively detected in the flat valley bottoms of the Yukon River and Coffee Creek.

Table 7-1. Java Road 2015 snow tracking results.

Habitat	Road Km[1]	Transect	Snowshoe Hare	Lynx	Moose	American marten	Weasel sp.	Wolf
			Present/# fresh tracks					
Boreal High	0	11	Yes/0		Yes/2	Yes/2		
	0	10			Yes/0	Yes/1		
	0	5	Yes/6		Yes/0			Yes/0
	0	4	Yes/4	Yes/1				
	0	3	Yes/6					Yes/0
	0	2	Yes/24					
	0	1	Yes/6					
	0	30	Yes/13					Yes/8
	0	33	Yes/2		Yes/0	Yes/2		
	0	31	Yes/1				Yes/1	Yes/5
	0	32	Yes/4			Yes/1		
	1	27	Yes /15	Yes/2				
	2	19	Yes/1			Yes/1		
	3	18			Yes/0	Yes/7		
	4	17			Yes/0	Yes/1		Yes/0
	5.5	16			Yes/2	Yes/0		
	6.7	26			Yes/0			
	8.2	15						
	9.8	14			Yes/0			
	11.2	25			Yes/0			
Subalpine	12.5	24			Yes/0	Yes/0		
	13.7	13			Yes/2	Yes/0		
	15.3	12			Yes/0	Yes/2		
	16.7	23			Yes/0	Yes/1		
	17.5	9			Yes/0	Yes/1		
	18.7	22				Yes/2	Yes/8	
	19.7	20				Yes/4		
	19.7	21			Yes/0	Yes/1		
	20.5	6			Yes/0	Yes/4		
	21	8			Yes/0	Yes/5		Yes/0
	21	7			Yes/0	Yes/4		

[1] The Java Road runs from the current barge landing on the Yukon River to the proposed mine site area; 0 km is located at the barge landing.





Legend

Snow Tracking Transect

Proposed Route

Coffee Property

FIGURE 7-1

2015 Java Road snow tracking surveys: transects

Data Sources
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Digital Elevation Model (30 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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Map Reference Scale: 1:85,000 (Printed at 8.5 x 11)
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7.2 NORTHERN ACCESS ROUTE – 2016

7.2.1 METHODS

A wildlife snow tracking survey was conducted along the length of the NAR between February 22 and 26, 2016 by EDI biologists Dawn Hansen and Ben Schonewille. The survey was conducted using snowmobiles along many sections of the proposed NAR beginning at King Solomon Dome and extending south to the end of the existing Java Road and beyond to the Kona deposit. The route was broken into 12 transects which varied in length between 4.8 and 35 km. Transects were: Sulphur, Indian River, Eureka, Henderson Dome, Maisy May, Stewart River, Barker, Thistle, Thistle to NAR, Ballarat, Yukon River and Kona Java. Transects were broken into 1 km segments. Within each segment, the presence/absence and approximate count of fresh tracks for each species was recorded. In total, 204 one-kilometer long segments were surveyed.

Tracks for each species were recorded as few (one to three fresh tracks), some (four to eight fresh tracks), many (nine to 15 fresh tracks), very many (>15 fresh tracks) and old tracks.

Where possible, the proposed NAR was followed; however, a number of sections of road could not be accessed as they have not yet been constructed, or were impassible at the time of the survey. In the Thistle Mountain area, an attempt was made to access the proposed route along the Barker/Ballarat pass (Thistle to NAR transect); however, it could not be reached due to site conditions (steep hills).

Presence and relative number of tracks were recorded in a database and analyzed using ArcGIS to capture attributes for each kilometer section. Each segment was represented as a centroid point and various GIS layers were point-sampled to get general attributes for each segment. A digital elevation model, land cover layer, and fire history layer were all used in the tracking data analysis.

7.2.2 RESULTS

Tracks from at least 15 different species were recorded during February 2016 snow tracking surveys. Of all 204 one-kilometer long segments surveyed, only two did not have any fresh tracks present. A summary of snow tracking results for focal baseline species (caribou, moose, wolf, wolverine, lynx, American marten and red fox (*Vulpes vulpes*) is provided in Table 7-2. Other species' tracks which were detected include snowshoe hare (n=147), red squirrel (n=100), grouse/ptarmigan (n=67), porcupine (n=3), vole/mouse (n=3), American mink (*Neovison vison;* n=2), river otter (*Lontra canadensis*; n=1), and northern hawk owl (*Surnia ulula*; n=1).

At the time of the survey snow depth in the area varied ranging from 14 cm to 96 cm, with an average of 45 cm and it was thought to be approximately 10 days since the most recent snowfall. The snow depth was the deepest along the Maisy May transect, with an average depth of 58 cm. Drifted snow was encountered along the Kona Java transect (Table 7-3).

Snow tracking transects covered the range of different habitat types present along the proposed NAR. The elevation range of the survey route ranged from 344–1,447 m. The percentages of major land cover types present along the survey route were as follows:

- Shrub – 49%
- Coniferous – 13%
- Herbs – 10%
- Exposed Land – 8%
- Water (on frozen rivers) – 7%
- Other classes (broadleaf, mixedwood, rock/rubble, wetland) – 13%.

The Dawson Goldfields region is heavily influenced by fire. Transects traversed areas burned <1 year ago (burn year 2015; 6% of transects), 11 years ago (2004; 20%), and 26 years ago (1989; 2%); 72% of transects traversed unburned areas.

Caribou and wolverine tracks were observed more in higher elevations while wolf and lynx tracks were observed more at lower elevations. Of the segments that had moose tracks present, 55% were in shrub and 12% in coniferous land cover units (of all segments surveyed, 49% occurred in shrub habitat and 13% occurred in coniferous habitat). Tracks from all species were observed more in unburned areas than burned areas. No caribou tracks were found in areas that burned in 2015. Figure 7-2 through Figure 7-8 show the spatial distribution and relative abundance of fresh tracks found for all focal species in relation to the proposed Project infrastructure. A summary of tracks observed by species is listed in Table 7-2.

Moose tracks were observed in 130 of the 204 segments and were most common along sections that were snow-tracked (i.e. packed). Fresh moose tracks were not observed as frequently in areas near the major river corridors (Stewart, Yukon and Indian). Caribou tracks were concentrated in the higher elevation habitats of the Thistle Mountain, Henderson Dome, Eureka Ridge and Kona Java areas. Some tracks were also noted along Sulphur Creek. American marten tracks were found distributed across the study area and in a range of habitat areas. Wolf tracks were observed less frequently in higher elevation areas — subalpine sections of the Java Road, Thistle Mountain and Henderson Dome had less frequently observed tracks. There were also low elevation areas along the Sulphur Road where wolves were absent. Lynx tracks were observed more in low elevation areas and in forested areas where placer mining occurs. Lynx were observed on many of the transect segments of Ballarat Creek, Maisy May Creek, Indian River and Sulphur Creek. Compared to other wildlife, red fox tracks were detected relatively infrequently; however they were found distributed over the entire study area. Wolverine tracks were observed infrequently but tracks were observed on the following areas: Java Road, Thistle Mountain, Barker Creek, Henderson Dome, Eureka Ridge and Sulphur Creek.

Table 7-2. 2016 Northern Access Route snow tracking survey summary.

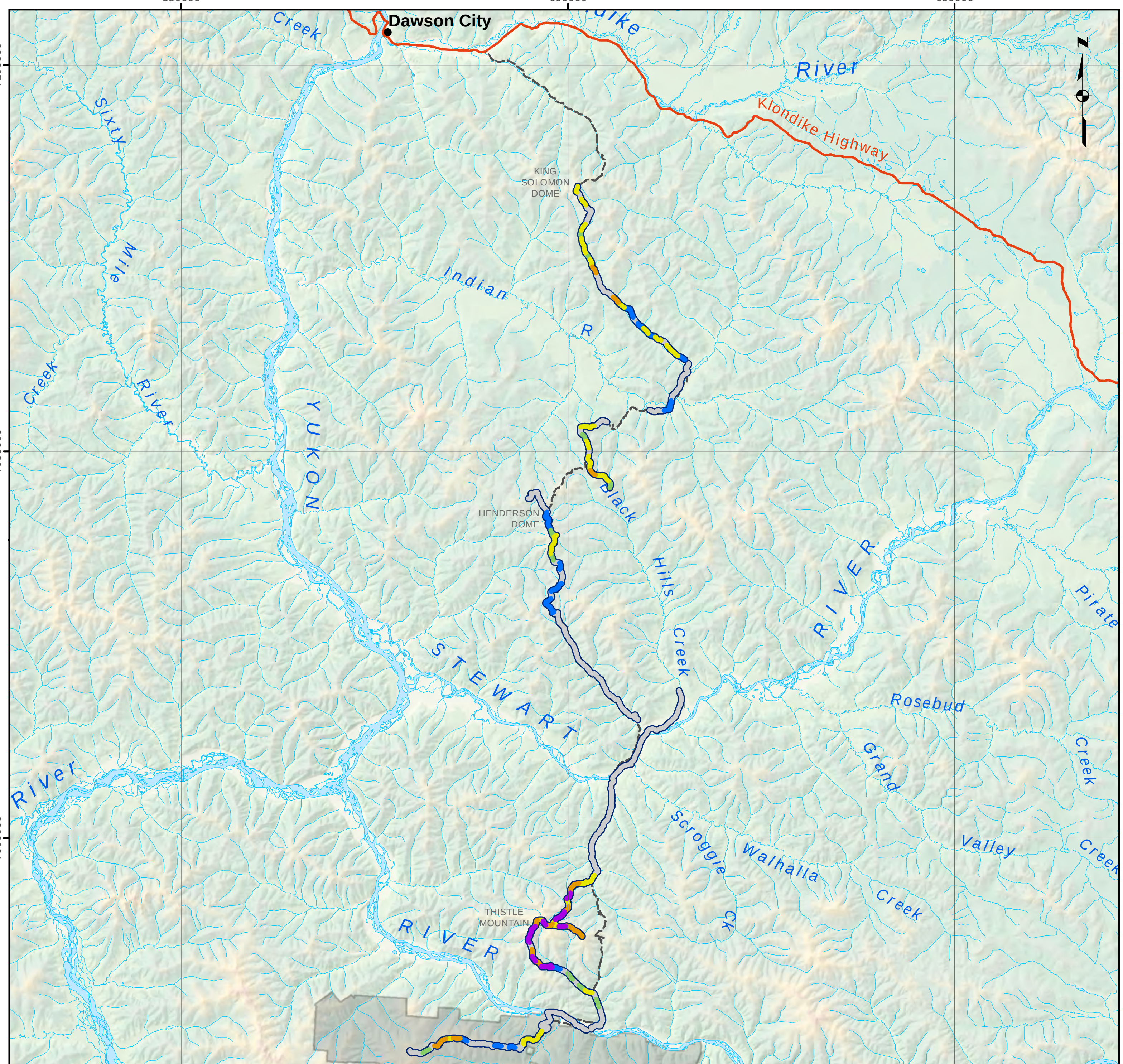
Species	Number of segments with fresh tracks	Common landcover types where tracks were observed (% of tracks)	Average elevation (m)	Elevation range (m)[1]	Years since burn (% of tracks)
Caribou	71	Shrub (68%) Herbs (13%)	938	469–1447	11 (23%) Unburned (77%)
Moose	130	Shrub (55%) Coniferous (12%)	781	344–1447	0 (5%) 11 (21%) 26 (2%) Unburned (72%)
Wolf	132	Shrub (43%) Coniferous (12%) Water (11%) Herbs (11%) Exposed Land (9%)	674	344–1447	0 (9%) 11 (18%) Unburned (73%)
Wolverine	14	Shrub (79%) Exposed Land (14%) Broadleaf (7%)	858	470–1309	0 (7%) 11 (21%) 26 (7%) Unburned (64%)
Lynx	55	Shrub (47%) Coniferous (13%) Herbs (13%)	645	344–1047	0 (4%) 11 (15%) Unburned (82%)
American marten	131	Shrub (51%) Coniferous (15%) Herb (10%)	778	344–1313	0 (7%) 11 (26%) 26 (2%) Unburned (65%)
Red fox	20	Shrub (40%) Coniferous (20%) Exposed Land (15%)	773	427–1358	0 (5%) 11 (10%) 26 (5%) Unburned (80%)

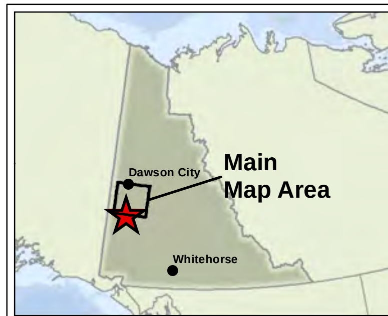
[1] Survey elevation range: 344–1,447 m

Table 7-3. Snow depth data collected during the 2016 Northern Access Route snow tracking survey.

Transect	Transect Segment	Elevation (m)[1]	Snow Depth (cm)	Comments
Sulphur	6-7	743-847	30	
Sulphur	8-9	727-752	25	
Sulphur	9-10	712-727	28	
Sulphur	29-30	549-557	37	
Indian River	1-2	524-530	14	
Eureka	0-1	1058-1103	81	
Eureka	1-2	1038-1058	54	
Henderson	0-1	977-1016	57	
Henderson	2-3	1009-1035	41	
Maisy May	0-1	965-1016	49	
Maisy May	3-4	1005-1009	96	large snow drifts
Maisy May	4-5	983-1005	62	
Maisy May	11-12	1010-1051	71	
Maisy May	14-15	780-867	37	
Maisy May	34-35	477-478	34	
Barker	0 - 1	861-978	45	
Barker	2-3	696-832	38	
Barker	19-20	380-422	32	
Thistle	15-16	926-1063	45	
Thistle	17-18	1028-1143	50	
Thistle	2-3	1028-1077	64	
Ballarat	1-2	452-453	35	airstrip
Ballarat	9-10	541-564	33	
Kona Java	0-1	1257-1316	47	
Kona Java	2-3	1109-1202	58	drifted snow
Kona Java	4-5	1107-1160	48	
Kona Java	6-7	1218-1218	52	
Kona Java	7-8	1199-1218	40	
Kona Java	9-10	1186-1211	55	
Kona Java	13-14	1074-1128	44	
Kona Java	19-20	683-763	42	
Kona Java	20-21	626-683	42	
Kona Java	21-22	622-626	42	
Kona Java	22-23	577-622	39	
Kona Java	23-24	448-500	37	
Kona Java	25-26	432-448	36	airstrip

[1] Elevation reported as approximate elevation at the beginning and end of each transect segment based on Digital Elevation Model.





Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Caribou Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-2

2016 Late winter snow tracking survey: caribou

Data Sources
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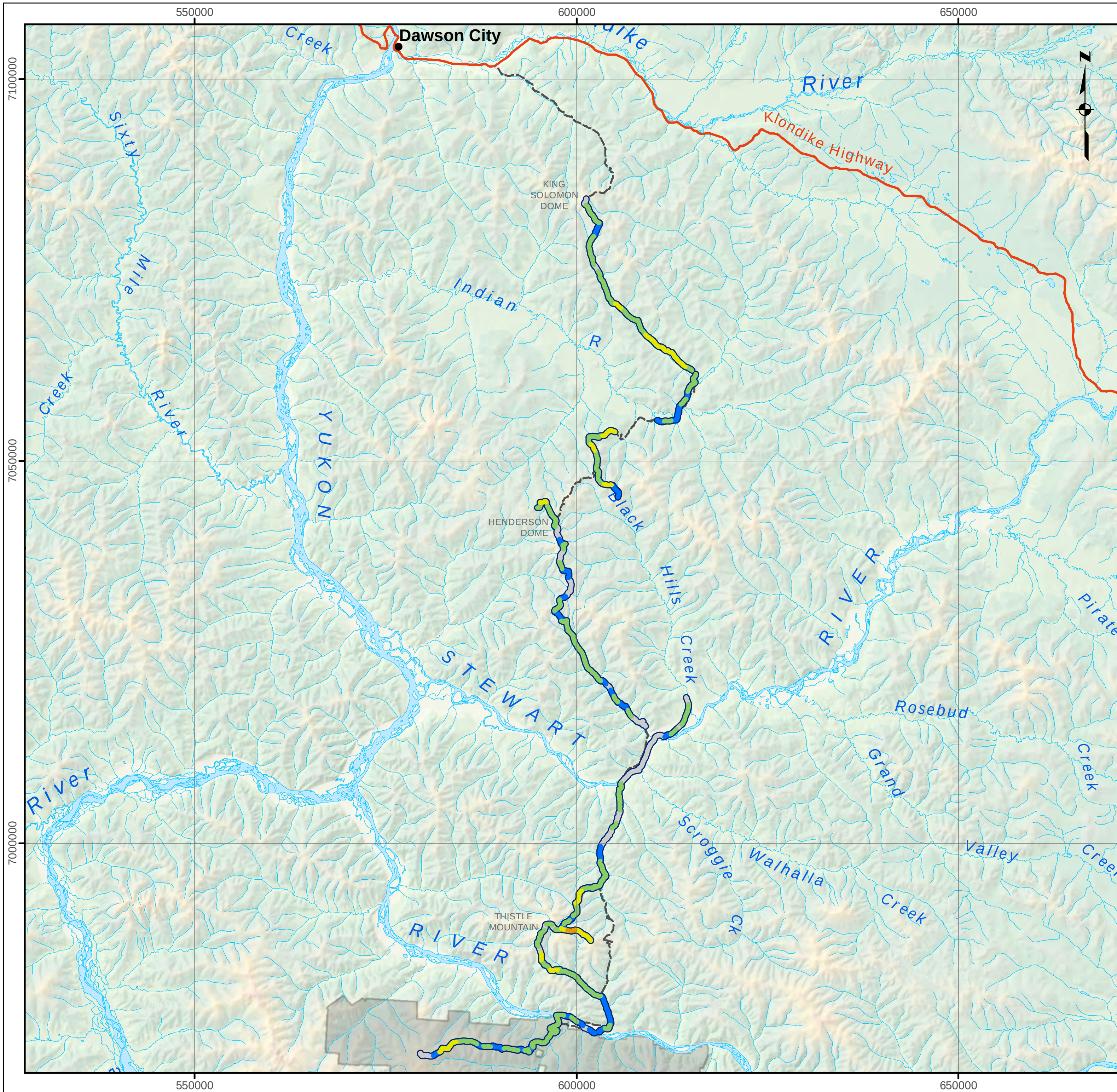

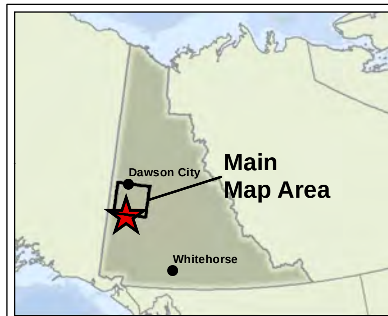

Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Moose Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-3

2016 Late winter snow tracking survey: moose

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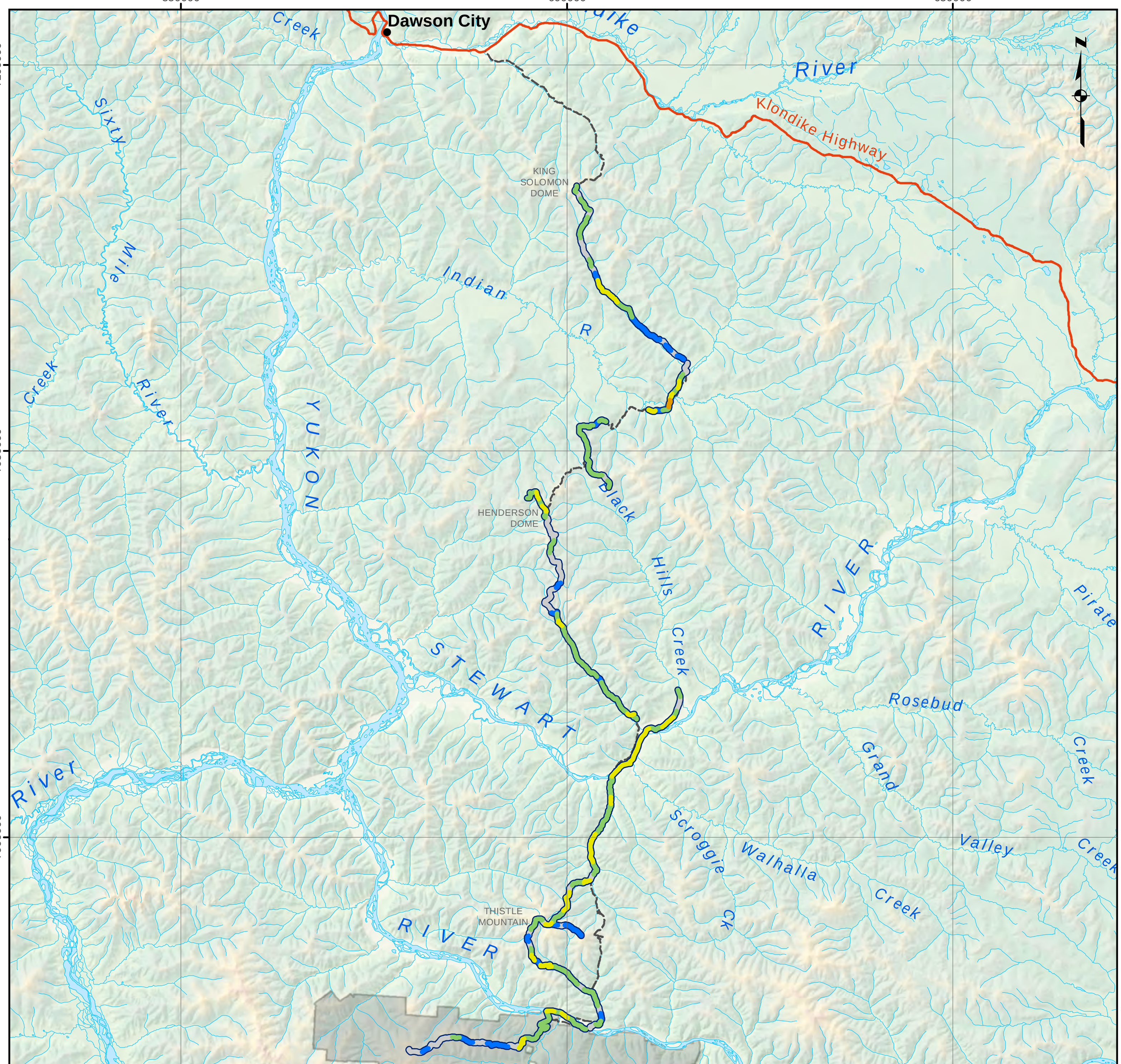

Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Wolf Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-4

2016 Late winter snow tracking survey: wolf

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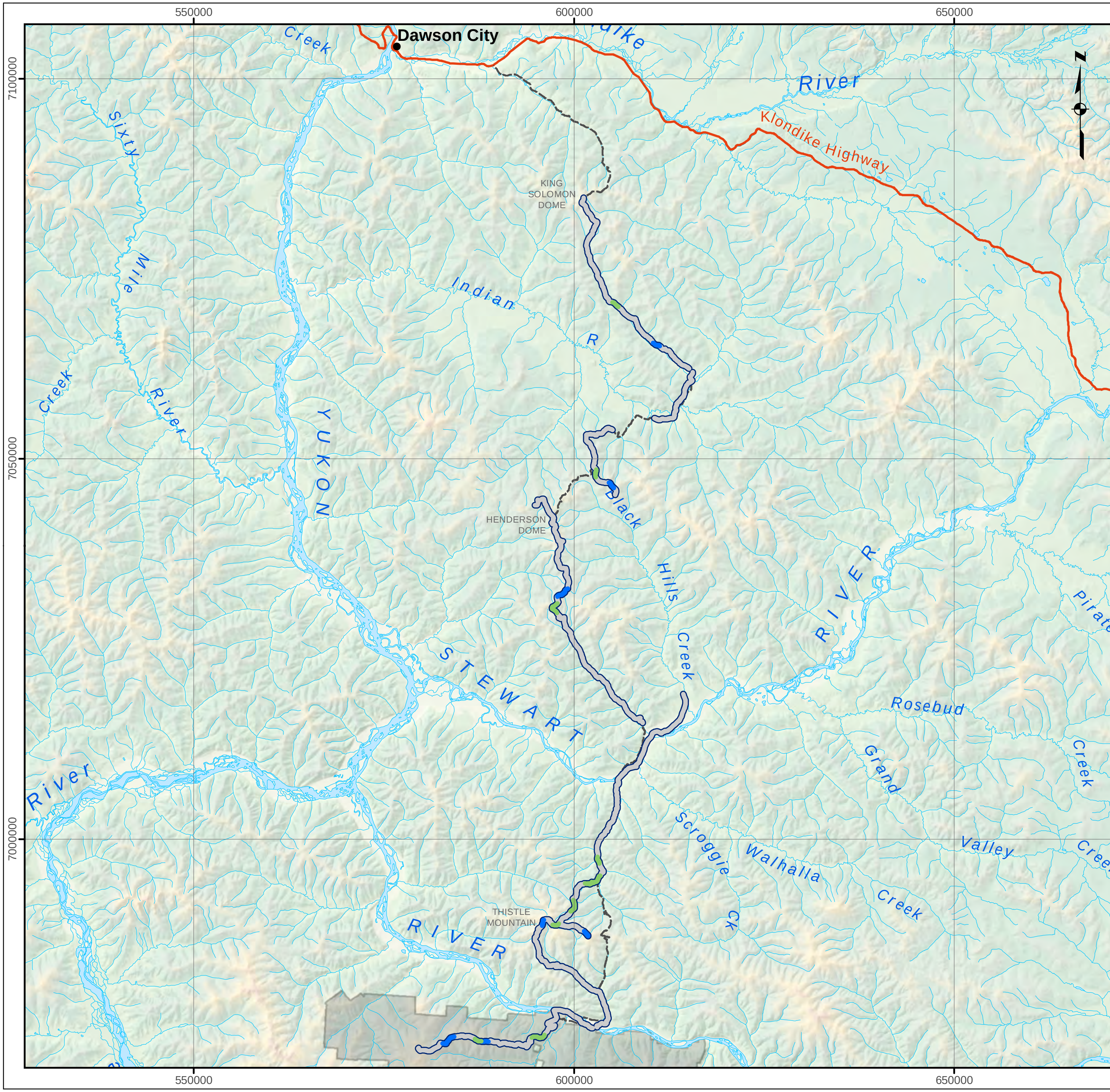

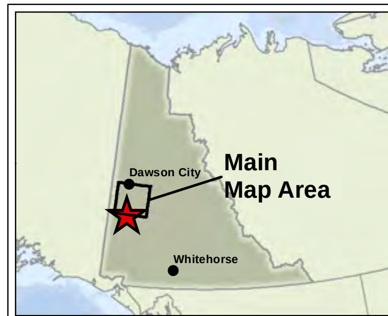

Legend

- ● Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Wolverine Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-5

2016 Late winter snow tracking survey: wolverine

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Map Reference Scale: 1:700,000 (Printed at 8.5 x 11)
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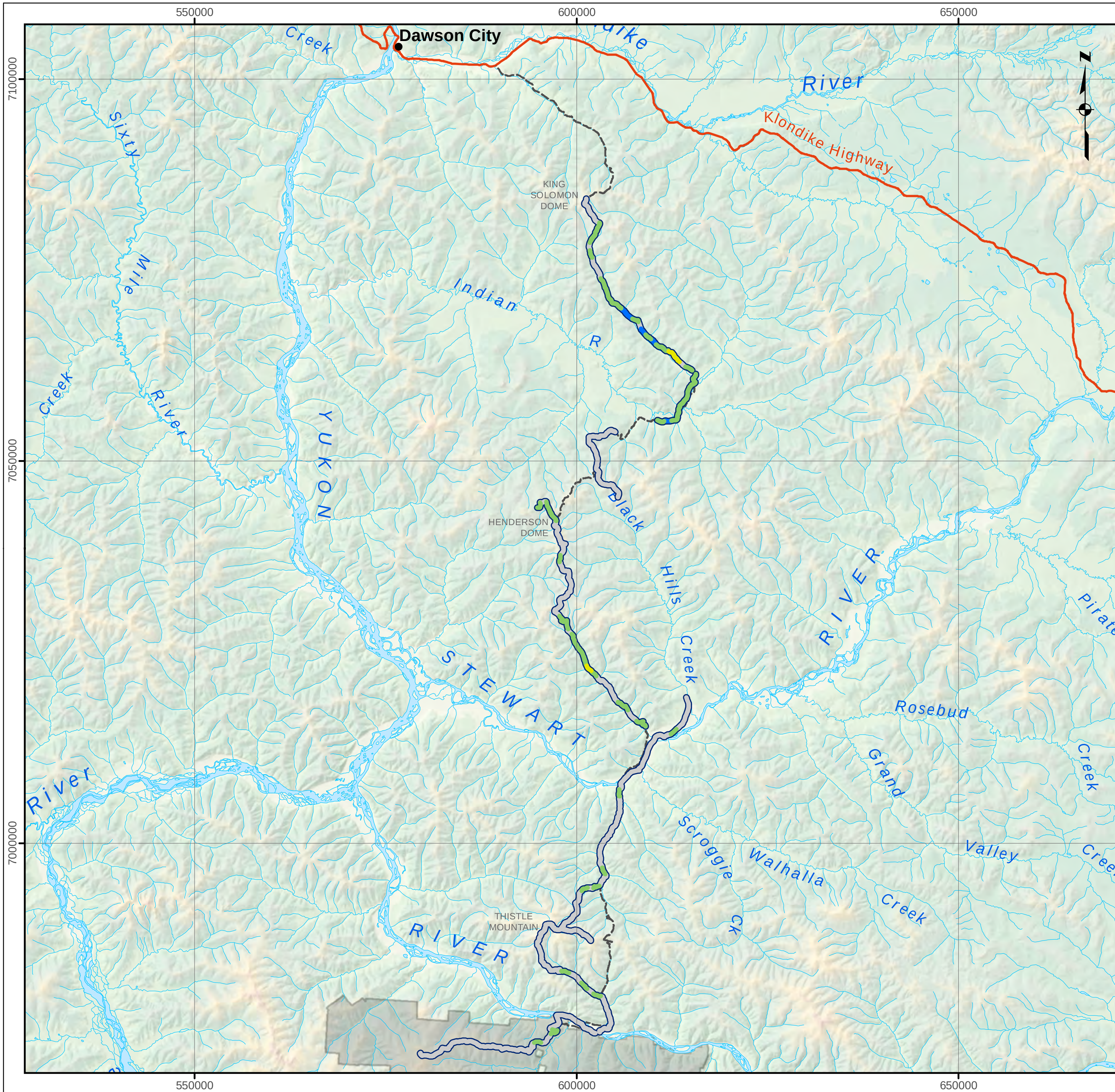

Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Lynx Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-6

2016 Late winter snow tracking survey: lynx

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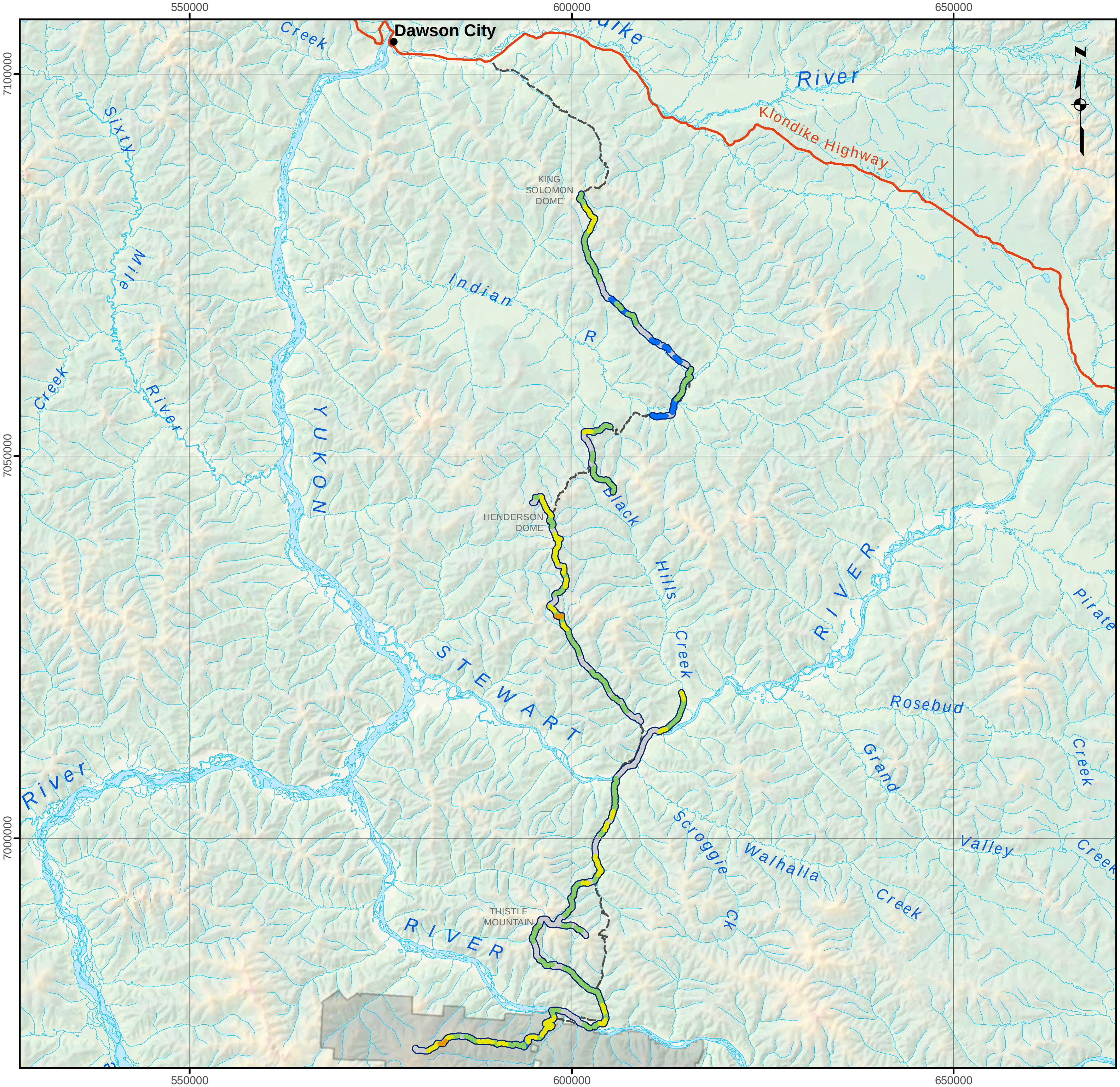

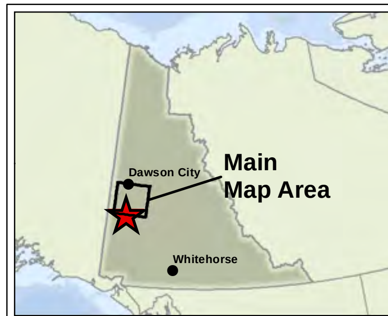

Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

American Marten Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-7

2016 Late winter snow tracking survey: American marten

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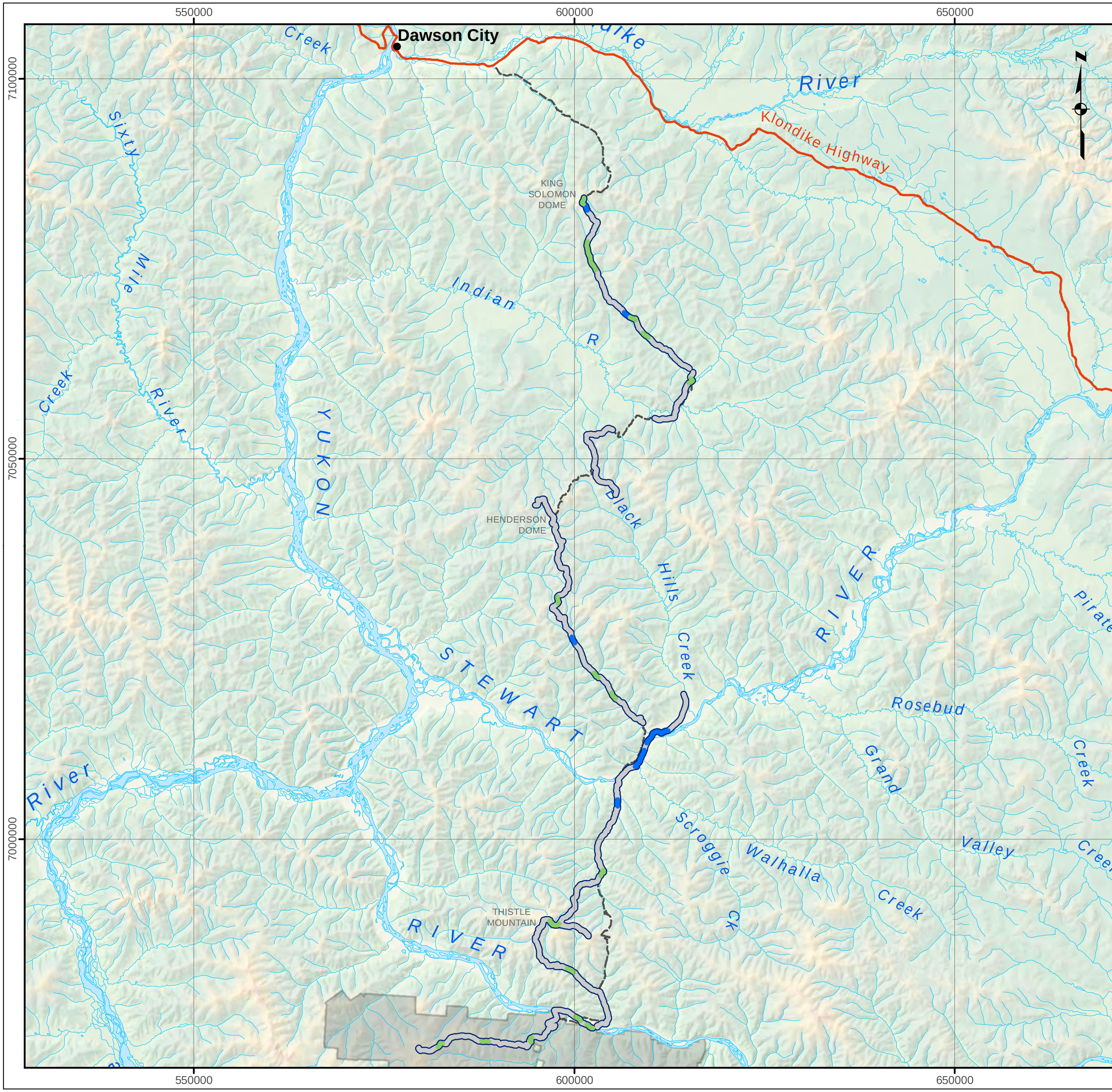

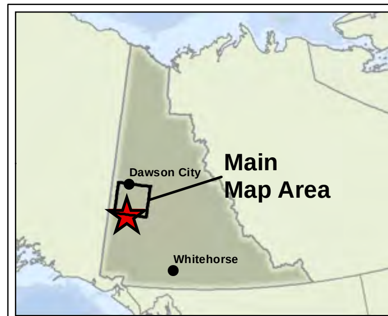

Legend

- Settlement/Community
- Highway
- Coffee Property
- Proposed Route

Red Fox Tracks Observed

- No Tracks
- Few
- Some
- Many
- Very Many
- Old Tracks

FIGURE 7-8

2016 Late winter snow tracking survey: red fox

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8 REMOTE CAMERA STUDIES

Starting in 2015, several studies were initiated using remote cameras. Focal species for these programs include thinhorn sheep, moose, caribou, and wolves. Specific studies conducted included:

- Thinhorn sheep monitoring (Ballarat Creek valley and nearby ridges);
- Wildlife trail monitoring (Ballarat Creek and Coffee Creek valleys);
- Monitoring of wildlife presence in areas investigated for potential mineral licks;
- A paired site wildlife road use study along the NAR; and
- Monitoring of baseline traffic levels along the existing sections of the NAR

Section 8.1 discusses the wildlife observation from the cameras installed in the Ballarat Creek and Coffee Creek areas, the traffic monitoring cameras along the proposed NAR, and cameras in the mineral lick investigation areas. Section 8.2 discusses the paired site wildlife road use study, which focuses on monitoring wildlife use, specifically use by ungulates and wolves, along the proposed NAR and other roads in the area. Section 8.3 details current levels of traffic based on remote cameras along the proposed NAR.

8.1 BALLARAT CREEK, DAWSON GOLDFIELDS, COFFEE CREEK

8.1.1 METHODS

During the summer of 2015, remote cameras were installed near the Ballarat and Coffee creek areas to document wildlife use — some associated with thinhorn sheep monitoring (see Section 5.2), and others monitoring broader wildlife use of the area. Additional cameras were installed in June 2015 along the proposed NAR to collect baseline traffic information along the existing Dawson Goldfield roads (Section 8.3), and in April 2016 in confidential areas for mineral lick investigations (Section 9). Figure 8-1 shows the location of all remote camera installations in the regional context. This section provides a brief summary of all wildlife sightings captured by remote cameras in the Ballarat Creek, Coffee Creek, NAR areas, and mineral lick investigation areas, but does not include the paired site wildlife road use study (described in Section 8.2).

Remote cameras used for wildlife and traffic monitoring were Reconyx PC900 Hyperfire cameras. Cameras were typically set to take three picture bursts on motion trigger with high sensitivity. The cameras were visited periodically by Kaminak EMs and/or EDI staff to ensure functionality, change batteries, and download data. At the time of reporting, camera data was available through late October 2016. Descriptions of the different camera sites including length of deployment at each site are outlined in Table 8-1.

Table 8-1. Ballarat Creek, Coffee Creek, NAR and mineral lick wildlife camera descriptions.

Site Name	Data Available	On Proposed Northern Access Route	Site Region	Focal Study
Ballarat West Ridge	29 May 2015 – 26 Oct 2016	No	Ballarat	Thinhorn Sheep
Ballarat West Valley	29 May 2015 – 26 Oct 2016	No	Ballarat	Thinhorn Sheep
Ballarat West Valley 2	4 June 2015 – 4 Aug, 2015	No	Ballarat	Thinhorn Sheep
Ballarat East Road	4 Aug 2015 – 25 Oct 2016	Yes	Ballarat	Thinhorn Sheep
Ballarat East Ridge	4 Aug 2015 – 25 Oct 2016	No	Ballarat	Thinhorn Sheep
Coffee Creek Trail	15 June 2015 – 27 Oct 2016	No	Coffee Creek	Wildlife Trail
Eureka Ridge Road	18 June 2015 – 23 April 2016	Yes	Eureka Ridge	Traffic Monitoring
Henderson Road	17 June 2015 – 24 Nov 2015	Yes	Henderson	Traffic Monitoring
Sulphur Road	25 Aug 2015 – 27 Sept 2016	Yes	Dominion	Traffic Monitoring
Maisy May Road	16 June 2015 – 23 Nov 2015	Yes	Maisy May	Traffic Monitoring
MML1	24 April 2016 – 25 Oct 2016	No	Confidential	Mineral Lick
MML2	24 April 2016 – 25 Oct 2016	No	Confidential	Mineral Lick
MML3	24 April 2016 – 25 Oct 2016	No	Confidential	Mineral Lick

8.1.2 RESULTS

Summer 2015, 2016

A total of 11 species were observed on the remote cameras during summer 2015 (May 29 – September 30), and eight species were observed during summer 2016 (May 1 – September 30), with a total of 185 and 182 wildlife observations in 2015 and 2016, respectively. Table 8-2 and Table 8-3 summarize the data collected on wildlife cameras during the summers of 2015 and 2016. Black bear (n=58, 94), moose (n=40, 27), and wolf (n=34, 14) were the most commonly observed species during the summer seasons. Although it is possible that the same animal triggered the cameras more than once during the study period, there were no attempts to identify individual animals. Other observations of note included four occurrences of mule deer photographed in the Ballarat Creek valley and three observations of grizzly bear (in the Ballarat Creek valley, Maisy May, and Eureka Ridge areas).

Winter 2015/2016

A total of 14 species of wildlife were observed between October 1, 2015 and April 30, 2016 with a total of 352 observations. The most frequently observed species in the winter were caribou and wolves, with 174 and 66 observations, respectively. Other commonly observed species included lynx, snowshoe hare, red squirrel, and moose. Caribou, presumably from the Fortymile caribou herd, were documented on remote cameras between October 27, 2015 and April 26, 2016. Caribou were observed most frequently on the Eureka Ridge Road camera, but were also captured at cameras in the Ballarat Creek, Maisy May, and Sulphur areas. Wolves were observed on all cameras with the exception of Ballarat West Ridge and Ballarat

West Valley. Many wolves were seen multiple times or on different cameras. The largest wolf pack observed had ten wolves. Other observations of note included mule deer photographed on six separate occasions in the Ballarat Creek valley, three observations of grizzly bear in the Ballarat Creek valley, and three observations of wolverine — two in the Sulphur area and one in the Eureka Ridge area. Table 8-4 summarizes the wildlife observations from four cameras located on the NAR, four of the Ballarat Creek cameras, and the Coffee Creek camera.

Table 8-2. Summary of wildlife camera observations for summer[1] 2015.

Camera (dates deployed)	**Moose**	**Mule Deer**	**Grizzly Bear**	**Black Bear**	**Wolf**	**Lynx**	**Marten**	**Weasel sp.**	**Porcupine**	**Snowshoe Hare**	**Red Squirrel**
Ballarat West Ridge		2									
Ballarat West Valley	9	2	1	29	7		1	1	4	10	3
Ballarat West Valley2				3	4					1	1
Ballarat East Road	3			11	3	7			2		
Ballarat East Ridge				4		3				2	1
Coffee Trail	6			6	2					1	
Eureka Ridge	1		1		1						
Henderson Ridge	6			5							
Sulphur	2				11	4				2	
Maisy May	13		1		6	3					
Total	**40**	**4**	**3**	**58**	**34**	**17**	**1**	**1**	**6**	**16**	**5**

[1] Summer is defined as May 1 – September 30; actual camera deployment dates vary and are stated above in Table 8-1.

Table 8-3. Summary of wildlife camera observations for summer[1] 2016.

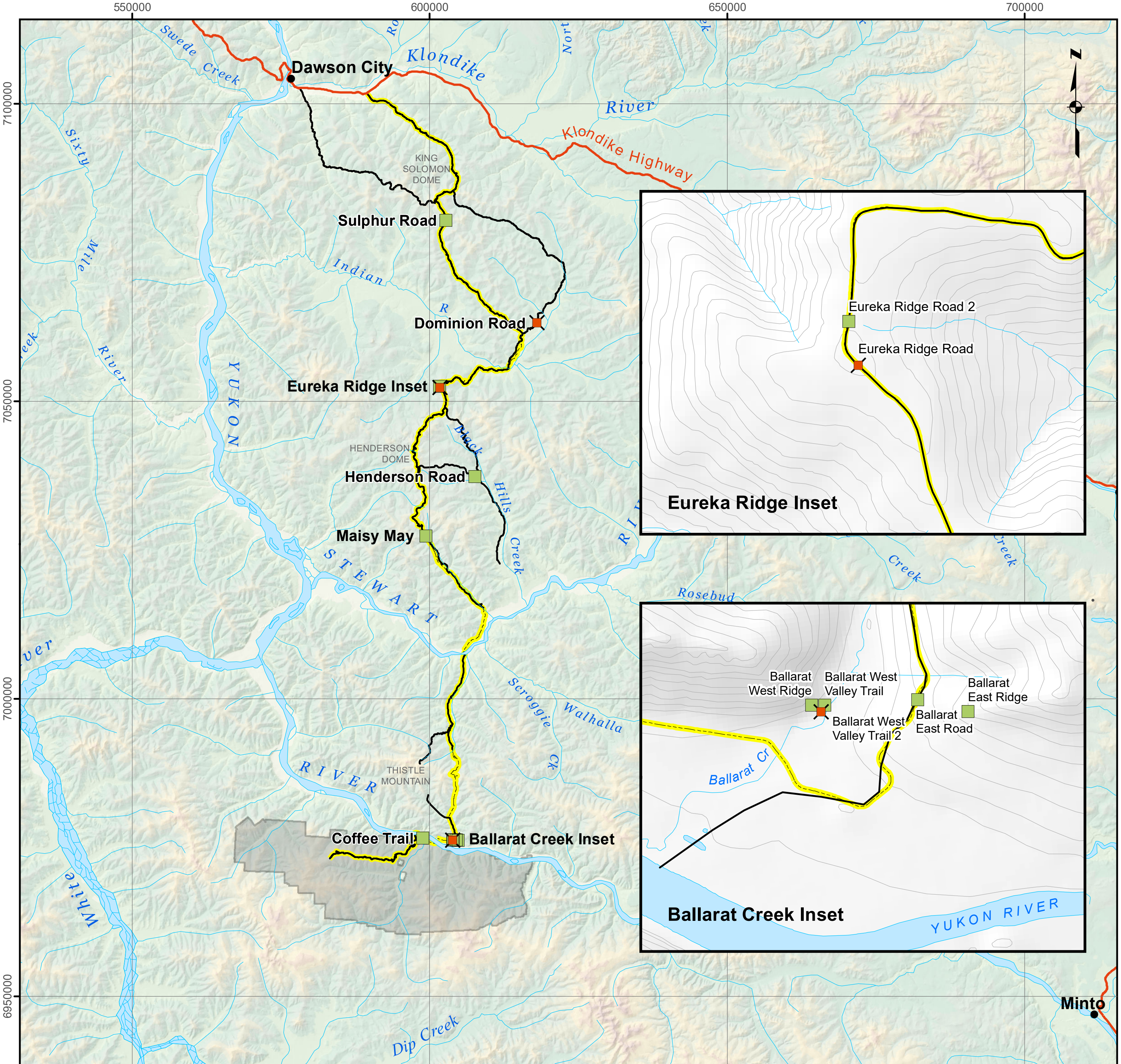
Camera (dates deployed)	**Moose**	**Black Bear**	**Wolf**	**Lynx**	**Marten**	**Porcupine**	**Snowshoe Hare**	**Red Squirrel**
Ballarat West Ridge		1						
Ballarat West Valley	5	3		2			4	
Ballarat East Road	7	7	5					
Ballarat East Ridge		3						
Coffee Trail	10	42	2	3	1		7	1
Eureka Ridge								
Sulphur	2	4	7	14		2	3	
MML1	1	32						5
MML2		1						
MML3	2	1		1			4	
Total	**27**	**94**	**14**	**20**	**1**	**2**	**18**	**6**

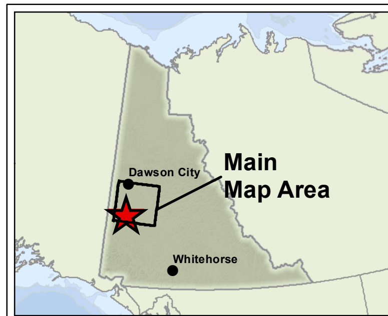
[1] Summer is defined as May 1 – September 30; actual camera deployment dates vary and are stated above in Table 8-1.

Table 8-4. Summary of wildlife camera observations for winter[1] 2015/2016.

Camera (dates deployed)	**Caribou**	**Moose**	**Mule Deer**	**Grizzly Bear**	**Black Bear**	**Wolf**	**Wolverine**	**Lynx**	**Marten**	**Coyote**	**Porcupine**	**Red Fox**	**Snowshoe Hare**	**Red Squirrel**
Ballarat West Ridge			5											
Ballarat West Valley				3	2								3	
Ballarat East Road	15	1	4			19			1					
Ballarat East Ridge	21					6		4						1
Coffee Trail						1			1				13	15
Eureka Ridge	112	4				18	1	3			1		3	
Henderson Ridge						7								
Sulphur	20	6				14	2	26		1	1	1	9	
Maisy May	6					1		1						
Total	**174**	**11**	**9**	**3**	**2**	**66**	**3**	**34**	**2**	**1**	**2**	**1**	**28**	**16**

[1] Winter is defined as between October 1 and April 30 of the following year; actual camera deployment dates vary and are stated above in Table 8-1.





Legend

- Settlement/Community
- Camera Location - Currently Active
- Camera Location - Deactivated
- Highway
- Existing Access
- Proposed Route
- Coffee Property

FIGURE 8-1

2015/2016 remote camera locations (not including paired site cameras)

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Data collected by EDI (2015) was obtained using Garmin GPS technology.

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

0 10 20 30 40
KM

Map Reference Scale: 1:900,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: MP	Checked: AM/LP	Date: 2/24/2017

KAMINAK GOLD CORPORATION
EDI

Path: O:\2017\Y0032_Goldcorp_Coffee\GIS\Baseline\FieldPrograms\202_Wildlife\MXD\Fig8_1_2015_RemoteCamera.mxd

8.2 PAIRED SITE WILDLIFE ROAD USE STUDY

Facilitated predation is often raised as a concern associated with developing new roads or maintaining (i.e. clearing) existing roads year round. During consultation for the Coffee Project, concerns were raised by Yukon Environment and First Nations about increased wolf use along the NAR during the winter, potentially leading to increased predation. Although the majority of the NAR is located along existing roads in the area, the majority of these roads are not currently plowed during the winter months; Project use of the NAR would require that these roads be cleared throughout the winter.

In response to these concerns, an exploratory paired site remote camera study was initiated in November 2015 with the purpose of collecting data on wildlife use of the existing roads pre-Project. Wolves are the focal species for this study; however other species of interest include moose, caribou, wolverine, grizzly bear and black bear. This study will provide information to describe current wildlife road use and will inform future study designs and monitoring efforts aimed at determining whether wildlife use of the road changes under a winter maintenance regime.

8.2.1 METHODS

Six areas were identified along the proposed NAR alignment south of the Indian River where roads are not currently maintained during winter. Three areas were located between the Indian and Stewart rivers and three were located between the Stewart and Yukon rivers. For each paired site, two cameras were installed on existing roads/trails. One camera was installed on a road which will become the NAR alignment. The second camera was installed on a nearby road or trail that is not expected to be maintained for winter, even after the development of the NAR (off-route). Out of the twelve cameras installed, six of these cameras lie directly on the proposed road alignment. The cameras at each site were given alphanumeric identifiers, starting with the same letter (ex. A1 and A2). The camera locations and a site description can be found in Figure 8-2 and Table 8-4 respectively. Reconyx PC900 Hyperfire cameras were used at all sites. Cameras were set to take three picture bursts on motion trigger with high sensitivity.

All paired site cameras were installed on November 23 or 24, 2015. Cameras were serviced every few months; during servicing, the data cards were collected and batteries were replaced if needed. Photo data from all cameras was analyzed up to October 2016 and all wildlife and human observations were recorded. Between 143 and 158 days of remote camera effort were analyzed for winter 2015/2016, and between 0 and 153 days of remote camera data were analyzed for summer 2016 (Table 8-5). A couple of issues were encountered during the summer of 2016 resulting in shorter deployments for a few of the cameras — camera H1 went missing in mid-April 2016 and was replaced on August 22, 2016 and thus was only deployed for 38 days during the summer; cameras E1 and E2 were not active for the summer; and camera B1 had a battery error on August 5, 2016 and was therefore only active for 97 days during summer 2016.

Table 8-5. Paired wildlife cameras site descriptions.

Site Name	Length of Deployment (days) Winter[1] 2015/2016	Length of Deployment (days) Summer[2] 2016	On Proposed Northern Access Route	Site Region	Site Comment
A1	158	153	No	Ballarat Creek	
A2	158	153	Yes	Ballarat Creek	
B1	158	97	Yes	Upper Barker Creek	On NAR alignment but a connected road currently does not exist
B2	158	153	No	Upper Barker Creek	
D1	158	153	No	Lower Barker Creek	On an overgrown trail
D2	158	149	Yes	Lower Barker Creek.	
E1	147	0	Yes	Maisy May Creek	On a main road very near but not quite on the NAR alignment
E2	147	0	No	Maisy May Creek	
F1	157	152	No	Henderson Dome	
F2	157	152	Yes	Henderson Dome	
H1	143	38	Yes	Indian River	
H2	157	152	No	Indian River	

[1] Winter is defined as between October 1 and April 30 of the following year; actual camera deployment lengths vary and are stated above.

[2] Summer is defined as May 1 – September 30; actual camera deployment lengths vary and are stated above.

8.2.2 RESULTS

Wolf Observations Winter 2015/2016

During the 2015/2016 winter season wolves were observed on at least one of the two cameras at all paired sites. Wolves were observed on both cameras at Sites A (Ballarat Creek), B (Upper Barker Creek), E (Maisy May) and H (Indian River). Wolves passed cameras along the NAR 76 times with packs ranging in size between one and eight animals. Along the off-route roads, wolves passed the cameras 23 times with packs ranging in size between one and eight animals (Table 8-6). A total of 199 individual wolves were counted passing the cameras along the NAR, and 63 passed along the off-route areas. For multiple observations, it is the same wolf or wolf pack passing the camera on multiple occasions.

The majority of winter wolf observations along the proposed NAR came from camera H1 along the Indian River and Yukon Quest trail. With the exception of Site A, it appears that wolves currently use the existing roads along the NAR alignment more than they use the off-route roads in winter (Table 8-6). Several of the off-route cameras are located on small road/trails, including some that are overgrown, short, or have dead ends. These factors may explain why fewer wolves were seen on the off-route cameras during this first year of baseline data collection.

Wolf Observations Summer 2016

During the summer of 2016 wolves were observed on at least one of the two cameras at all paired sites, except site E, where no wolves were observed. Wolves were observed on both cameras at Sites A (Ballarat Creek), and F (Henderson Dome). Wolves passed cameras along the NAR 35 times in packs ranging in size between one and nine animals, and passed along the off-route roads 38 times in packs ranging in size between one and eight animals (Table 8-6). A total of 68 individual wolves were counted passing the cameras along the NAR, and 59 passed along the off-route areas.

The majority of summer wolf observations along the proposed NAR came from camera F2 in the Henderson Dome area. In summer, it appears that wolves currently use the existing roads along the NAR alignment at sites A and D more than they use the off-road routes, and use the off-road routes more frequently at sites B and H. An equal amount of individual wolves were observed using existing roads along the NAR alignment and the off-road route at site F (Table 8-6).

Other Wildlife Observations

Wolves were the most common wildlife species documented on the paired site cameras during the 2015/2016 winter season. Other wildlife species detected on the cameras including caribou, moose, lynx, American marten, red squirrel, and snowshoe hare (Table 8-7). Caribou, presumably from the Fortymile caribou herd, were the most common species detected after wolves, and were seen at 6 of 12 cameras sites including cameras in the Ballarat Creek, Upper Barker Creek, Maisy May Creek, Henderson Dome and Indian River areas. The most caribou were seen at camera F2 which is located in a subalpine area in the vicinity of Henderson Dome. Caribou were observed on paired site cameras between November 27, 2015 and January 8, 2016.

During the summer of 2016, wolves were again the most common species detected on paired site cameras, followed by snowshoe hare, lynx, black bear, moose, porcupine, grizzly bear, red squirrel, and red fox (Table 8-7). Grizzly bears observations were made at Sites A (Ballarat Creek) and D (Lower Barker Creek), including a grizzly sow with a cub observed in the Barker Creek area.

Across all paired cameras, human activity was recorded at 7 of 12 camera sites. Human activity recorded at paired site cameras included people walking, walking with a pulk, snowbiking, dogsled teams, snowmobiles, ATVs, dirt bikes, pick-up trucks, fuel trucks, grader/plows, and other miscellaneous machinery. During the winter months, cameras B2, D2, E1, F1, F2, H1 and H2 all had human presence — most of this use coincided with early season work in the Dawson Goldfields in late March and April (e.g. grader/plows, pickup trucks). Additionally, camera H1 in the Indian River Valley was located along the Yukon Quest trail and had several observations of snowmobiles and dogsled teams in late January and February. Cameras D2, F1, and H2 also had snowmobile observations during the winter months. During the summer months, cameras D2, F1, F2, H1 and H2 all documented human presence. See Table 8-9 and Table 8-10 for more details on human and vehicle observations.

Table 8-6. Wolf observations from paired wildlife camera study during winter[1] 2015/2016 and summer[2] 2016.

		Northern Access Route: A2, B1, D2, E1, F2, H1			Off-route road: A1, B2, D1, E2, F1, H2		
Site	Season	Wolf pack observations[3]	Total wolves recorded	Pack size range	Wolf pack observations	Total wolves recorded	Pack size range
A	Winter	15	48	1–7	19	56	1–8
	Summer	3	17	2–9	11	14	1–2
B	Winter	1	1	1	1	2	2
	Summer				1	1	1
D	Winter	23	55	1–8			
	Summer	9	17	1–5			
E	Winter	2	10	4–6	1	3	3
	Summer	N/A	N/A	N/A	N/A	N/A	N/A
F	Winter	3	5	1-3			
	Summer	23	34	1–6	18	34	1–8
H	Winter	32	80	1–8	2	2	1
	Summer				8	10	1–2
Total	**Winter**	**76**	**199**		**23**	**63**	
	Summer	**35**	**68**		**38**	**59**	
Wolf Observations from Other Cameras on the Northern Access Route[4]							
Sulphur	Winter	8	19	1–10			
	Summer	8	8	1			
Eureka	Winter	9	19	1-7			
	Summer	N/A	N/A	N/A			
Ballarat	Winter	5	19	1–6			
	Summer	5	8	1–3			

[1] Winter is defined as between October 1 and April 30 of the following year; actual camera deployment lengths vary and are listed in Table 8-4.

[2] Summer is defined as May 1 – September 30; actual camera deployment lengths vary and are listed in Table 8-4. In particular, cameras B1 and H1 had a shorter deployment during the summer of 2016 as compared to the other cameras.

[3] Observation is defined as a temporally distinct camera trigger which may be a group or an individual (e.g. a group of 7 is counted as one observation)

[4] Wolf observations from other cameras on the NAR are not from the paired wildlife camera study but are provided for comparison with the paired study results. Refer to Section 8.1 for more information on these cameras.

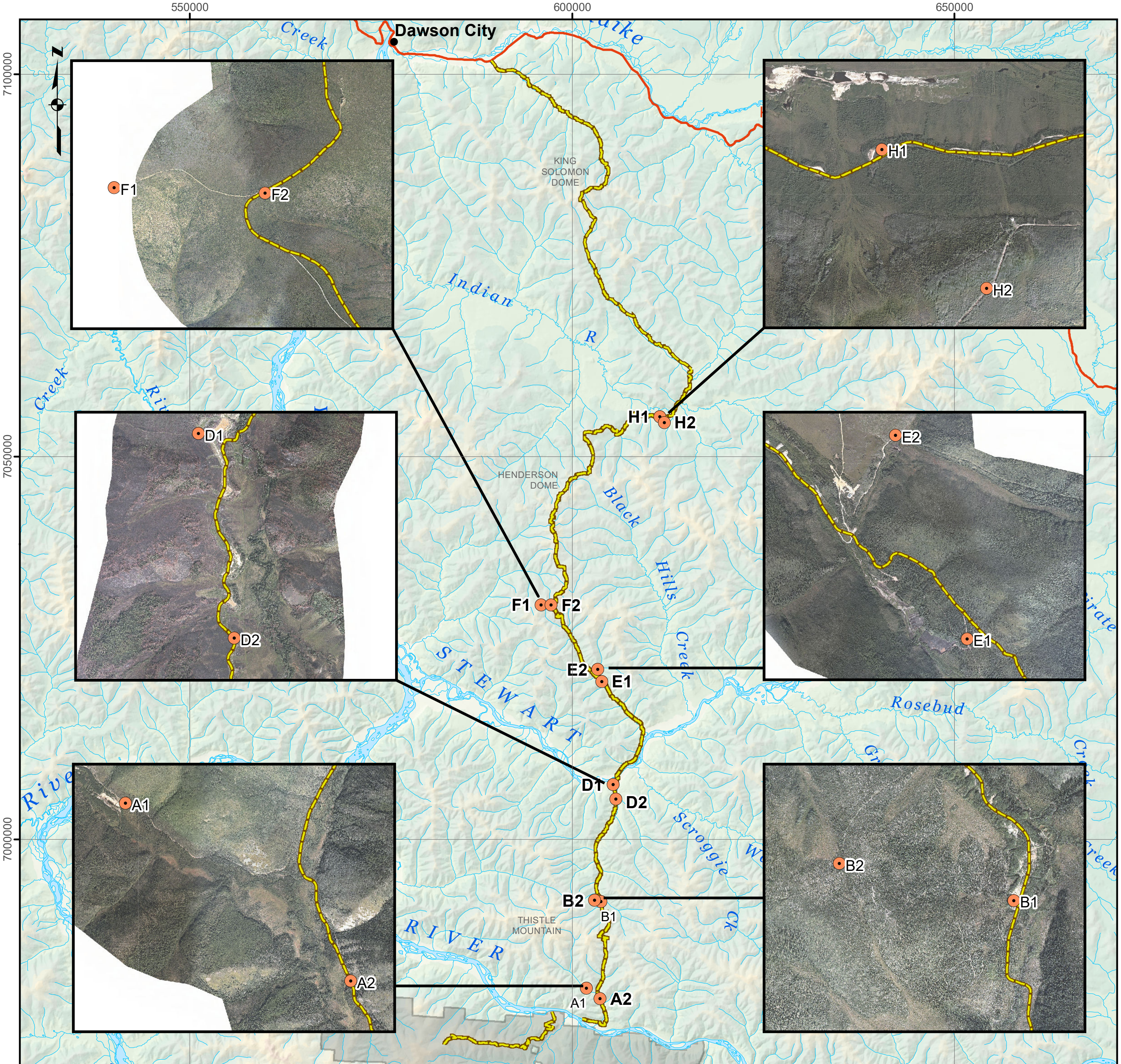
Table 8-7. Caribou and other wildlife observations from paired wildlife camera study, including NAR and off-road cameras during winter[1] and summer[2].

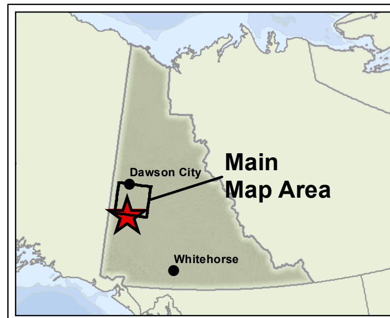
Site	Season	Caribou Groups[3]		Total Caribou		Moose		Lynx		Snowshoe Hare		Grizzly Bear		Black Bear		Red Fox		Porcupine		American Marten		Red Squirrel	
		NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road	NAR	Off-road
		Number of Animals Observed																					
A	Winter	10	8	23	20		1	27	24	11	16									2		2	
	Summer					1	17	59	34	21	19	4	2	23	17	4		6				7	
B	Winter		3		7			1		4													
	Summer					3	5	1		31				1	5								
D	Winter							1															
	Summer					1	5	2		2		2		3									
E	Winter							3	3	7	2									1	1	6	
	Summer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F	Winter	14	3	50	8	7				1	2										1	2	
	Summer					26	3	6	1	24	3			2	3			1	1				
H	Winter	3		9				14	5		8												
	Summer					2	1		18		13				12				4				
Total	**Winter**	**27**	**14**	**82**	**35**	**7**	**1**	**46**	**32**	**16**	**28**									**3**	**2**	**10**	
	Summer					**33**	**31**	**68**	**53**	**78**	**35**	**6**	**2**	**29**	**37**	**4**		**7**	**5**			**7**	

[1] Winter is defined as between October 1 and April 30 of the following year; actual camera deployment lengths vary and are listed in Table 8-4.

[2] Summer is defined as May 1 – September 30; actual camera deployment lengths vary and are listed in Table 8-4. In particular, cameras B1 and H1 had a shorter deployment during the summer of 2016 as compared to the other cameras.

[3] Observation is defined as a temporally distinct camera trigger which may be a group or an individual (eg. a group of 7 is counted as 1 observation)





Legend

- Settlement/Community
- Camera Location
- Proposed Route
- Highway
- Coffee Property

FIGURE 8-2

2015/2016 Paired site wildlife road use camera locations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Data collected by EDI (2015/2016) was obtained using Garmin GPS technology.

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

0 5 10 15 20
KM

Map Reference Scale: 1:700,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: MP	Checked: AM/LP	Date: 2/24/2017

KAMINAK GOLD CORPORATION EDI

Path: O:\2017\17Y0032_Goldcorp_Coffee\GIS\Baseline\FieldPrograms\202_Wildlife\MXD\Fig8_2_2015_16_PairedSiteCamera.mxd

8.3 NORTHERN ACCESS ROUTE TRAFFIC MONITORING

8.3.1 METHODS

A baseline study was conducted along the potential alignments of the proposed NAR to document current levels of traffic and wildlife use of these roads. The study was initiated in June 2015 with several remote trail cameras (Reconyx PC900) installed along existing roads in the following locations: Sulphur Road; Dominion Road; Eureka Ridge; Henderson Road; and Maisy May Road. In the fall of 2015, additional remote cameras were established along the proposed NAR — the primary purpose of these cameras was for the collection of wildlife data associated with thinhorn sheep movements (Section 8.1) and the paired site wildlife road use program (Section 8.2); however the cameras also collected information on baseline traffic levels along the proposed NAR. With the addition of the thinhorn sheep and paired site cameras in the fall of 2015, several of the initial traffic cameras were discontinued. Table 8-8 lists the various remote cameras that provide information on baseline traffic levels along the proposed NAR and the dates for which traffic data is available.

All remote cameras were set to take pictures every time a vehicle or animal passed by. Results were tabulated by reviewing photos and recording the number of vehicles passing the camera on a daily basis. No distinction was made during this analysis of heavy vs. light vehicles and everything from heavy equipment to all-terrain vehicles were recorded. Snowmobiles and non-motorized users such as dog sleds were separated. Occasionally fast moving vehicles would trigger the cameras but move out of the frame before a photo was taken. This was still recorded as a vehicle as typically there was evidence such as fresh tire tracks, blowing trees/leaves or dust/snow plumes. All wildlife recorded by the cameras is summarized along with the other wildlife camera observations in Sections 8.1 and 8.2.

Table 8-8. Remote cameras providing information on baseline traffic levels along the Northern Access Route

Road Section	Camera Name	Primary Camera Program	Data Available	Comments
Sulphur	Sulphur Road	Traffic Monitoring	25 Aug 2015 – 20 Aug 2016	
Dominion	Dominion Road	Traffic Monitoring	19 June 2015 – 26 June 2015	Camera malfunctioned for unknown reasons shortly after deployment.
Indian River	H1	Paired Site Study	24 Nov 2015 – 14 April 2016, 22 Aug 2016 – 29 Sept 2016	Camera was stolen after April 2016, replaced in August 2016
Eureka Ridge	Eureka Ridge Road/ Eureka Ridge Road2	Traffic Monitoring	18 June 2015 – 23 April 2016	Camera was moved a couple hundred meters in August 2015 to better capture traffic. Camera was destroyed during road maintenance activities after April 2016.
Henderson	Henderson Road	Traffic Monitoring	17 June 2015 – 24 Nov 2015	After Nov 2015, traffic data along Henderson was available through camera F2 located approximately 21 km by road from the Henderson Road camera.
Henderson	F2	Paired Site Study	24 Nov 2015 – 27 Sept 2016	
Maisy May	Maisy May Road	Traffic Monitoring	16 June 2015 – 24 Nov 2015	After Nov 2015, traffic data along Maisy May was available through camera E1 located approximately 9 km by road from the Maisy May Road camera.
Maisy May	E1	Paired Site Study	23 Nov 2015 – 24 April 2016	
Barker[1]	D2	Paired Site Study	23 Nov 2015 – 26 Sept 2016	
Ballarat	A2	Paired Site Study	23 Nov 2015 – 22 Oct 2016	

[1] Paired site camera B1 (Upper Barker) is also located along the NAR alignment; however, a connected road currently does not exist. Therefore, camera B1 was not used in the traffic monitoring.

8.3.2 RESULTS

Remote camera monitoring along the proposed NAR between June 2015 and October 2016 found that pre-Project traffic levels vary across the study area with higher traffic levels found along the northern sections of the proposed road and limited traffic in the south. Traffic levels also vary seasonally with the majority of the traffic occurring between April and October (although in the north, December and January were the only months in which pickup trucks and/or heavy equipment were not observed on the road). Table 8-9 and Table 8-10 provide the average daily traffic volumes and winter traffic observed on cameras along the proposed NAR.

Traffic levels are highest through the Indian River valley and the sections of the road north of the Indian River. Sulphur Road had the most traffic of all the roads surveyed with average daily traffic volumes of approximately 30 vehicle passes/day between June and September. Similarly, the camera installed along the Dominion Road in June 2015 recorded an average daily traffic volume of 31 vehicles per day over seven days before the camera malfunctioned and stopped recording data. For the Indian River area, traffic data is not available between May and July, but traffic volumes between mid-August and September averaged 23 vehicle passes/day. In 2015, the last vehicle to pass on both the Sulphur Road and Indian River was observed on November 28. In 2016, the first vehicle was observed on February 22 along the Sulphur Road and on March 4 along the Indian River. During the winter months, snowmobile traffic was observed November – March; however, both the Sulphur and Indian River locations recorded frequent winter motorized and non-motorized use of the roads in January and February, coinciding with the Yukon Quest sled dog race.

Between Eureka Creek and the Stewart River, traffic volumes range from an average of 5 vehicle passes/day between June and October along Eureka Ridge to less than one vehicle/day along Maisy May. In 2015, the last vehicle was observed on November 28 along Eureka Ridge, and on September 30 along Maisy May. The first vehicle to pass in 2016 was observed on April 5 at Eureka Ridge and on April 21 at Maisy May. During the winter, the Eureka Ridge area also saw frequent winter motorized and non-motorized use of the roads; this area is also part of the Yukon Quest sled dog race.

South of the Stewart River, the observed traffic decreased considerably. Traffic volumes were generally less than one vehicle/day and most of the observed traffic was concentrated in the lower sections of Barker Creek. Traffic along lower Barker Creek was observed between April 25 and October 2, 2016. Winter traffic was also limited with only a few snowmobile observations made over the 2015/2016 winter.

Table 8-9. Average daily traffic[1] volume (passes/day) at remote camera sites along the Northern Access Route.

Road Section (Camera Name)		Average Daily Traffic Volume (passes/day)											
		January	February	March	April	May	June	July	August	September	October	November	December
Sulphur (Sulphur Road Camera)	2015								38.8	27.0	6.5	0.8	0
	2016	0	0.5	2.9	4.5	19.1	28.3	29.1	29.3				
Indian River (H1)	2015												0
	2016	0	0	1.6	3.2				23.4	21.6			
Eureka Ridge (Eureka Ridge Road/ Eureka Ridge Road 2)	2015						3.2	3.6	4.1	7.6	5.6	0.7	0
	2016	0	0	0	3.7								
Henderson (Henderson Road/F2)	2015						1.4	0.8	2.0	2.5	0.8	0	0
	2016	0	0	0	0.7	2.2	2.5	2.1	2.8	2.6			
Maisy May (Maisy May Road/E1)	2015						0.7	0.6	0.5	0.9	0	0	0
	2016	0	0	0	0.1								
Barker (D2)	2015												0
	2016	0	0	0	0	0.5	0.1	0	0.2	1.5			
Ballarat (A2)	2015												0
	2016	0	0	0	0	0	0	0	0	0.3			

[1]Traffic volumes listed includes all motorized traffic (with the exception of snowmobile traffic reported separately in Table 8-8) — everything from heavy equipment to all-terrain vehicles were counted, however, the majority of the use were passenger vehicles.

Table 8-10. Winter 2015/2016 traffic by snowmobile and dog-sled

Road Section (Camera Name)	Snowmobile and Dog Sled Traffic Volume by Month (passes/month)											
	November 2015		December 2015		January 2016		February 2016		March 2016		April 2016	
	Snow-mobile	Dog Sled	Snow-mobile	Dog Sled	Snow-mobile	Dog Sled	Snow-mobile	Dog Sled	Snow-mobile	Dog Sled	Snow-mobile	Dog Sled
Sulphur (Sulphur Road)	24	0	7	0	23	1	24	22	0	0	0	0
Indian River (H1)	0	0	0	0	9	0	15	22	4	0	0	0
Eureka Ridge (Eureka Ridge Road 2)	0	0	0	0	31	0	20	24	20	0	12	0
Henderson (Henderson Road/F2)	0	0	0	0	0	0	2*	0	0	0	0	0
Maisy May (Maisy May Road/E1)	0	0	0	0	0	0	2*	0	0	0	0	0
Barker (D2)	0	0	0	0	0	0	2*	0	3	0	0	0
Ballarat (A2)	0	0	0	0	0	0	2*	0	0	0	0	0

*Observations marked with an asterisk denote snowmobile observations resulting from the 2016 Coffee Project snow tracking survey and are not representative of typical winter traffic.

9 MINERAL LICK INVESTIGATIONS

Mineral licks are essential to a variety of ungulate species. They provide ungulates with required mineral nutrients, as well as aiding in digestion (through the consumption of soils) and potentially providing social gathering areas (Rea *et al.* 2004). Information provided by Environment Yukon and Tr'ondëk Hwëch'in indicated records of mineral licks in the Coffee Creek, Barker Creek, and Maisy May Creek valleys. Given the importance of these sites, determining the location of any mineral licks in the vicinity of proposed development is essential for Project planning and design. For the protection of these sites, and at the request of Environment Yukon, the specific locations of potential or confirmed mineral licks are not disclosed in this report.

9.1 METHODS

Surveys focused on locating mineral licks were conducted in the Coffee and Barker creek valleys in August 2015 and in the Maisy May creek valley in June 2016. Surveys involved both an aerial flyover and ground investigations. Ground-based surveys involved looking for concentrations of wildlife trails and when identified, following trails to search for mineral lick areas. During ground-based searches, all wildlife trails found were documented and investigated for some portion of their length. Additionally, a number of aerial ungulate surveys have also been conducted in the RSA by biologists who are familiar in identifying mineral licks.

9.2 RESULTS

Despite survey efforts, no mineral licks in the vicinity of Coffee, Barker or Maisy May creeks, or within the larger LSA, have been located to date.

The reported mineral lick in the Barker Creek valley is part of a WKA identified by Environment Yukon (2016). Environment Yukon provided EDI with the location and description of the mineral lick prior to field investigations. However, despite a thorough search of the location provided, EDI biologists failed to locate a mineral lick. Biologists also noted a lack of other wildlife sign that might indicate a mineral lick in the vicinity (e.g., wildlife trails, extensive ungulate sign). The description of the mineral lick provided indicated that it was an exposed bank resulting from mining or road development in the area. It is possible that a small mineralized seam or pocket was present when the bank was initially exposed but is no longer used by animals. Mining development in the area, or natural disturbance in the area (e.g., shifts in the bank due to permafrost melt or other geographic processes), may have resulted in the mineralized area no longer being exposed. In addition to a thorough search of the location provided, EDI biologists also walked the entire length of the proposed NAR that passes through the WKA. No evidence of a mineral lick was found along this section of the road.

Reports of a mineral lick in the Coffee Creek area were provided to EDI by both Environment Yukon and Tr'ondëk Hwëch'in, although neither could provide a specific location (i.e., geographic coordinates) and descriptions of site varied. EDI biologists and the Kaminak EMs searched several areas within the Coffee Creek valley which matched the descriptions provided, but no mineral licks were located. However, biologists did note an abundance of moose sign throughout the Coffee Creek valley and the surveys did locate several wildlife trails through the area. Given the reports from Environment Yukon and Tr'ondëk Hwëch'in, and the abundance of moose sign in the area, biologists could not rule out the possibility of a mineral lick in the area. To assess the potential for the proposed NAR to interact with a possible mineral lick in the Coffee Creek valley, biologists walked the proposed winter road crossing Coffee Creek for more than 1 km on either side of the creek; additionally, Kaminak EMs conducted a wildlife trail survey along the length of the Java Road (see Section 13.3). Neither survey located a mineral lick.

The location and description of a mineral lick in the Maisy May Creek valley was provided by the Tr'ondëk Hwëch'in. In late April 2016 the area was investigated by biologists and three wildlife cameras were installed along wildlife trails in the area described. The site was revisited and further investigated in mid-June 2016. To date, no mineral lick has been located. An additional assessment with the Tr'ondëk Hwëch'in is planned to confirm the exact location of the reported lick.

10 BAT SURVEYS

Information on bat distribution data, seasonal activity patterns, and roosting habitats for Yukon is not well studied; however, historical records confirmed repeat documented presence of the little brown myotis (*Myotis lucifugus)* from Dawson south to the British Columbia border. The little brown myotis has been assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is listed under the federal *Species at Risk Act* (*SARA*). To confirm the presence/absence of this species in the RSA and LSA, acoustic surveys were conducted in August 2014.

10.1 METHODS

Bat activity was monitored by acoustic detection of ultrasonic calls with bat detectors. Each acoustic monitoring site consisted of an AnaBat SD1 bat detector powered by a rechargeable 12 V battery. The detector units and battery were in a protective box set on the ground. Detectors were attached to a cable microphone (AnaBat Hi microphones) mounted 5 to 6 m above ground). Microphones were positioned over a reflective plexi-glass plate that was mounted 45° to horizontal resulting in the microphone sampling an area parallel to the ground.

The locations of the two sampling areas were chosen for the determination of bat presence: the Camp and Latte locations (Figure 10-1). The Camp location is on the north-eastern edge of an open wetland marsh bounded by mixed trees and shrubs with potential for foraging, roosting activity and flyway corridors. Coffee Creek and the Yukon River are both within 1 km. The Latte location is an upland elevated site with coniferous forest and dense low shrub areas. No permanent water was identified in the area. Possible habitat uses at this location could include roosting and flyway activity.

Accessibility, availability of trees and mounting structures, and open clearings for maximum detection of bat echolocation calls, were factors used to select AnaBat stations. At each station, the microphone was oriented to sample a space where foraging, commuting, or migrating bats would be detected. Details on the locations and habitat for the AnaBat stations are provided in Table 10-1. Bat activity was monitored for a minimum of four nights at each station in early August 2014. The summer months — June, July, and August being the warmest, is typically when seasonal bat activity is the highest.

The single detector was programmed to begin recording each evening at approximately 18:00 and to end at 30 minutes after sunrise (06:00), thus capturing any dusk and nocturnal activities of the shortened photoperiod (sunset ~23:00 and sunrise ~06:00). After four nights at the Camp location it was moved to the Latte location for six nights.

The AnaBat files were reviewed using the AnalookW program (Version 3.8 s) and noise files (all recorded files that do not contain a bat call) were excluded. After filtering the data to remove noise files, the remaining bat files were sorted into subfolders based on the night they were recorded. Identification of calls was based on the library of AnaBat calls for North American bat species provided by Titley Electronics and filters developed by D. Nagorsen, who also provided confirmation of bat species identified.

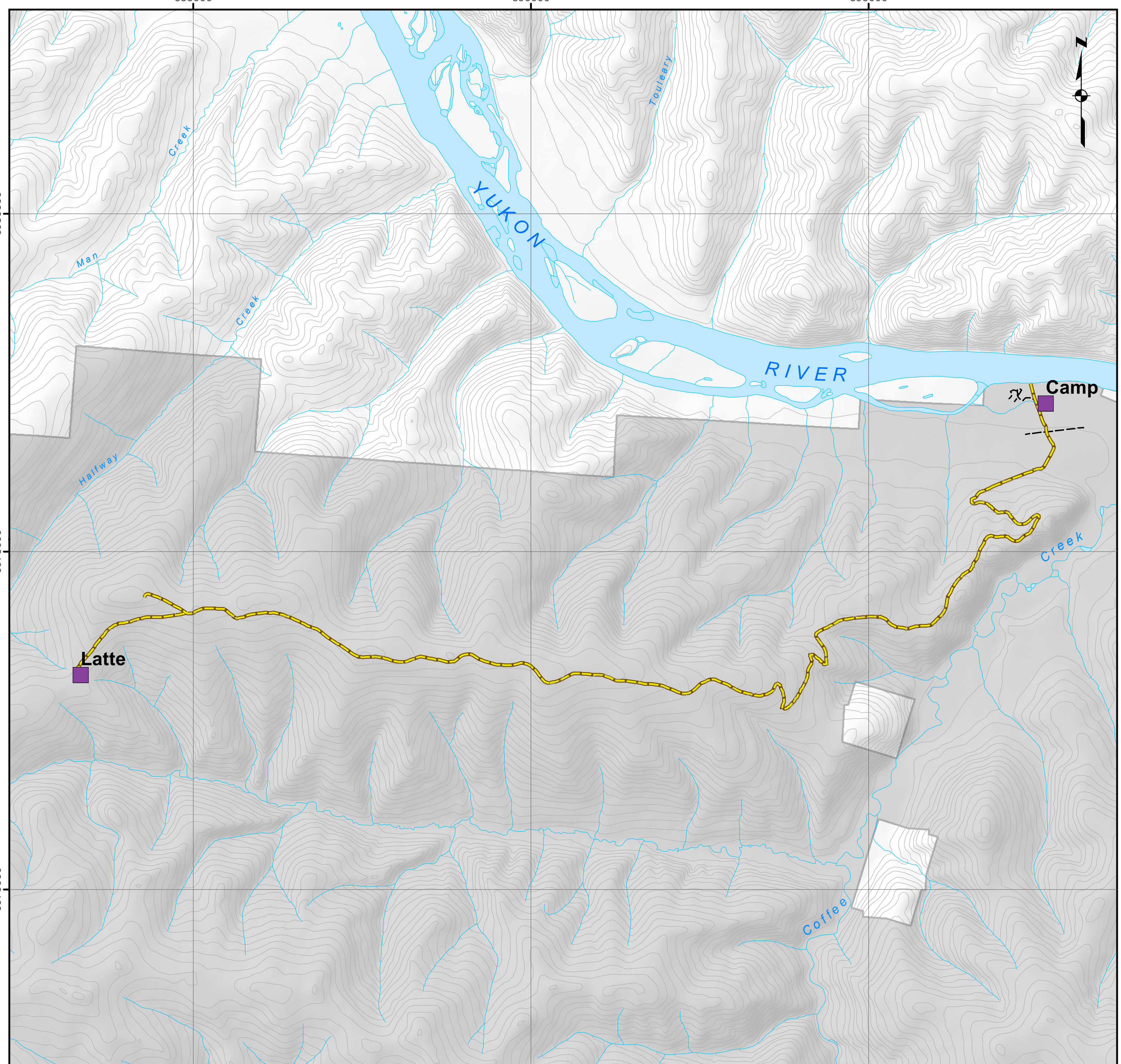
Table 10-1. Locations and positions of AnaBat stations.

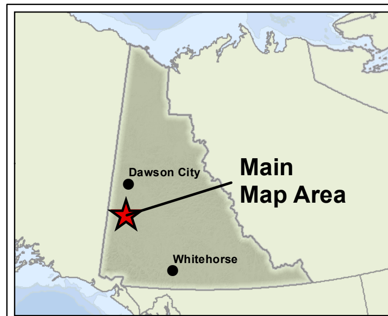
Station	Dates	Zone	UTM E	UTM N	Elev (m)	Mounting Structure	Mic Height (m)	Mic Orientation (degrees)
Camp	Aug 1 (1800)-5 (0600)	7	597621	6977191	430	Birch Tree	~5	90
Latte	Aug 5 (1800)-11 (0600)	7	583336	6973173	1105	Spruce Tree	~5	90

10.2 RESULTS

Bats were detected each night at the Camp location. Given the Camp's proximity to wetland habitat bordered by some larger trees, the bat activity is most like associated with foraging and daytime roosting. No bat data was recorded at the Latte site although a great deal of noise was recorded which may be an artifact of helicopter activity nearby given the site's proximity to the helicopter refueling station.

Analysis of the Camp location bat data identified all of the bat files as the little brown myotis. This is most probable species given the study location and the commonality of the little brown myotis in Yukon. Three files had a few calls that suggest features of the northern long-eared myotis (*Myotis septentrionalis*). A detailed review of slope and frequency of the questionable calls using the parameters of Broders *et al.* (2004) indicated that they are likely a bat flying in clutter or a sequence with some foraging calls and therefore not calls of the northern long-eared myotis. Additionally the Project is located well north of known occurrences of northern long-eared myotis.





Legend

- AnaBat Location
- Camp Roads and Airstrip
- Proposed Route
- Coffee Property

FIGURE 10-1

2014 AnaBat detector installation locations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Model (30 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Data collected by EDI (2015) was obtained using Garmin GPS technology.

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

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Map Reference Scale: 1:80,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: MP	Checked: AM/LP	Date: 2/24/2017

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11 COLLARED PIKA SURVEYS

Collared pikas were assessed as a species of Special Concern by COSEWIC in 2011 primarily due to their predicted sensitivity to climate change and poor dispersal abilities. Collared pikas were previously documented in the region during baseline surveys for the Casino Project (EDI 2014b). Pika distribution in the Coffee LSA and RSA was identified as an information gap during baseline wildlife studies, and as a result, pika surveys were conducted in 2014 and 2015.

11.1 PIKA SURVEYS – 2014

Pika surveys were initiated in 2014. Prior to the start of these surveys, collared pikas were observed incidentally in the southeastern section of the Coffee Property during breeding bird surveys in June 2014.

11.1.1 METHODS

Prior to field surveys, potential pika habitat within the Coffee Property was identified in ArcGIS using elevation, land cover, and high resolution satellite imagery. Potential habitats were identified as those located in alpine or subalpine areas at or above 1180 m in elevation, with rock or talus patches (identified as rock/rubble or other exposed land values in the Earth Observation for Sustainable Development (EOSD) land cover classification (Wulder *et al.* 2008). The identified habitats were then visually compared with high resolution orthoimagery (provided by Kaminak Gold Corp.) to ensure accuracy.

Collared pika surveys were completed between August 25 and 27, 2014 following select methods described in the *Tombstone Territorial Park Collared Pika Monitoring Protocol* (Andresen *et al.* 2011). Surveys focussed on potential pika habitat and sites within 5 km of proposed Project infrastructure were given priority during the surveys. Each point count involved two observers circling a talus patch in opposite directions, stopping periodically to listen and look carefully for pikas. Presence/absence for each patch was determined after at least 10 minutes of survey effort. For large patches, several replicate sites were often established and surveyed. Detection of pikas using this method is weather dependent as pikas reduce their above-ground activity during cold and/or wet weather.

EDI biologists Lee Hawkings and Meghan Marjanovic were assisted by Kaminak's EMs, Andrew Taylor and Robert Farr. Weather conditions were ideal for surveys with warm temperatures and no precipitation throughout. Areas surveyed included the southeastern portions of the Coffee Property along a possible road alignment to the Casino property, small talus patches within 5 km of the proposed Project footprint, and an area approximately 10 km southwest of the Latte deposit which was surveyed as a potential control area for post-Project monitoring (Figure 11-1).

11.1.2 RESULTS

Collared pika were found in a number of talus patch areas, all in the southeast portion of the Coffee Property at elevations greater than 1300 m. Pikas were not detected elsewhere in the Coffee Property or in the region southwest of the Coffee Property which was originally proposed as a control area for pika studies. Figure 11-1 shows the locations of all 2014 pika survey sites and observations.

11.2 PIKA SURVEYS – 2015

11.2.1 METHODS

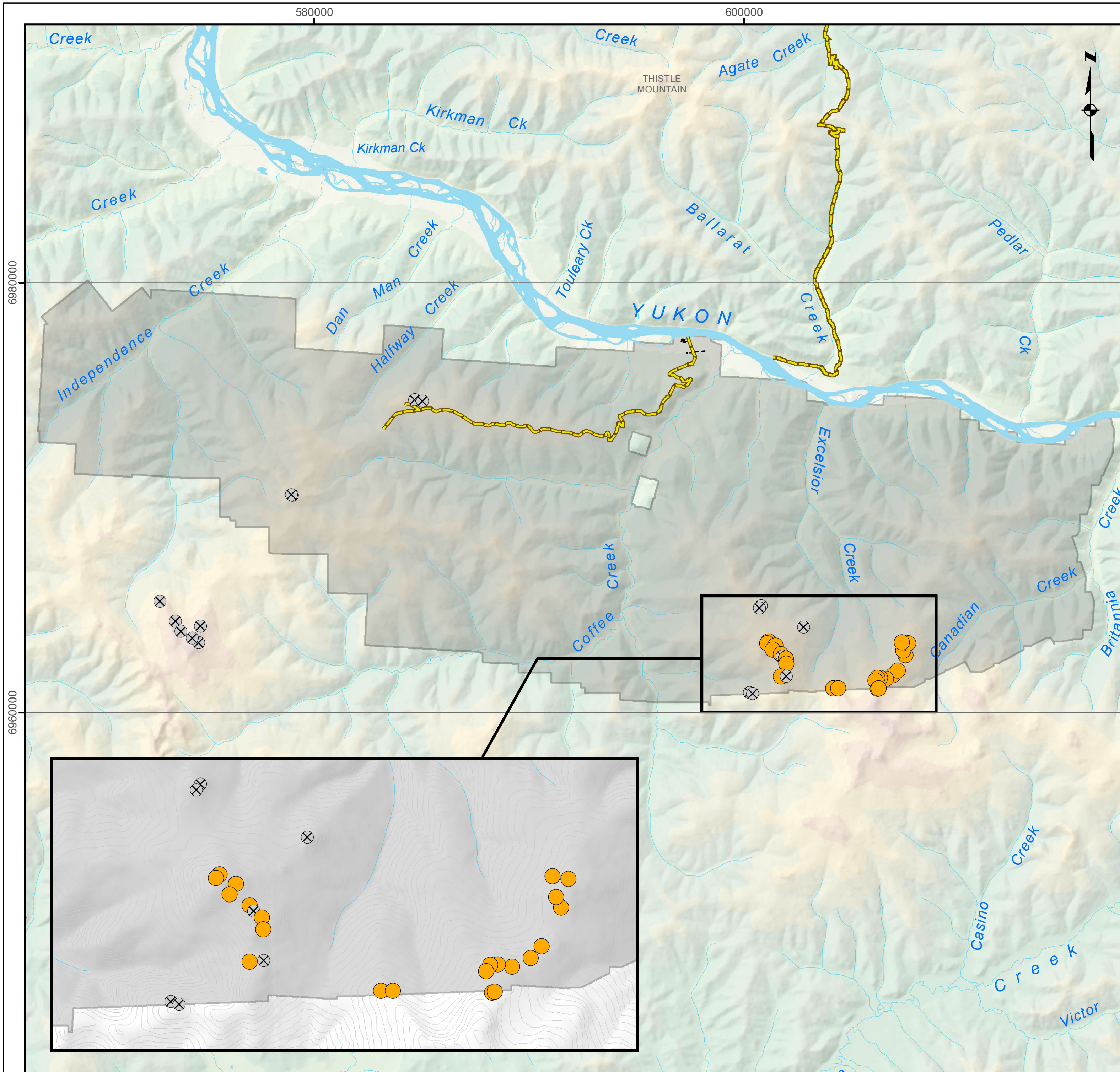
Prior to the 2015 surveys for collared pika, the habitat stratification used to identify potential pika habitat within the Coffee Property in 2014 was expanded to cover all areas within 5 km of the proposed NAR (including several alternate alignments under consideration at the time of the survey). The majority of the proposed alignment is too low in elevation to be considered as potential habitat for pika. Only three areas were identified as possibly having pika habitat: Thistle Mountain, King Solomon Dome, and Eureka Dome.

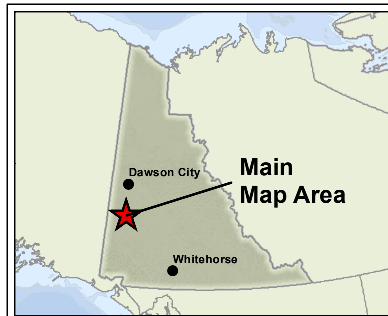
On August 3, 2015 EDI biologist Lee Hawkings and Kaminak EMs Robert Farr and Evan Warren conducted pika surveys in the southeastern portion of the Coffee Property, revisiting some of sites surveyed during the 2014 surveys. Surveys followed the same methods as the 2014 pika surveys described in Section 11.1. The survey effort is shown in Figure 11-2. Weather conditions in early August were ideal with warm temperatures and no precipitation.

The potential pika habitats in the King Solomon Dome and Eureka Dome areas were assessed by EDI biologists Anne MacLeod and Brodie Smith, in conjunction with vegetation surveys along the NAR between August 22 and 25, 2015. Biologists visited the King Solomon Dome area; however, the field visit determined that the identified habitat was a cleared area associated with the communications towers and was not actually suitable pika habitat. The Eureka Dome habitats were not visited since they are located more than 2 km from the closest potential road alignment (this alternate alignment was dropped later in 2015 and the final alignment of the NAR is further removed from Eureka Dome) and access was limited. However, the area was scanned with binoculars from the proposed road and does appear to have potentially suitable habitat. A second round of pika surveys was conducted between August 28 and 30, 2015 by EDI biologists Lee Hawkings and Dawn Hansen. The surveys were conducted in several areas of the Coffee Property as well as in potential habitat patches identified in the Thistle Mountain area. Weather was generally poor for these surveys following several days of cold wet weather and early season snowfall. Weather and snow conditions may have influenced observer abilities to detect pika.

11.2.2 RESULTS

During the early August surveys, pikas were found in locations similar to 2014 and were concentrated in the southeast portion of the Coffee Property. In late August, no pikas were found within the Coffee Property or on the north side of the Yukon River in the vicinity of Thistle Mountain and the NAR. No pikas were observed in late August even though at least one site had confirmed pika presence in 2014. The lack of pika detections during the late August survey may be due to the inclement weather preceding and during the survey. All 2015 pika survey sites and observations are displayed in Figure 11-2.





Legend

2014 Pika Survey Results

- Pika Detected/Observed
- No Pika Detected/Observed
- Proposed Route
- Camp Roads/Airstrip
- Highway
- Coffee Property

FIGURE 11-1

2014 Pika survey effort and observations

Data Sources
1:250,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Model and 1:250,000 National Topographic Database (NTDB) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Survey data collected by EDI Environmental Dynamics Inc. (2014).

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

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KM

Map Reference Scale: 1:250,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: MP	Checked: LH/LP	Date: 2/24/2017

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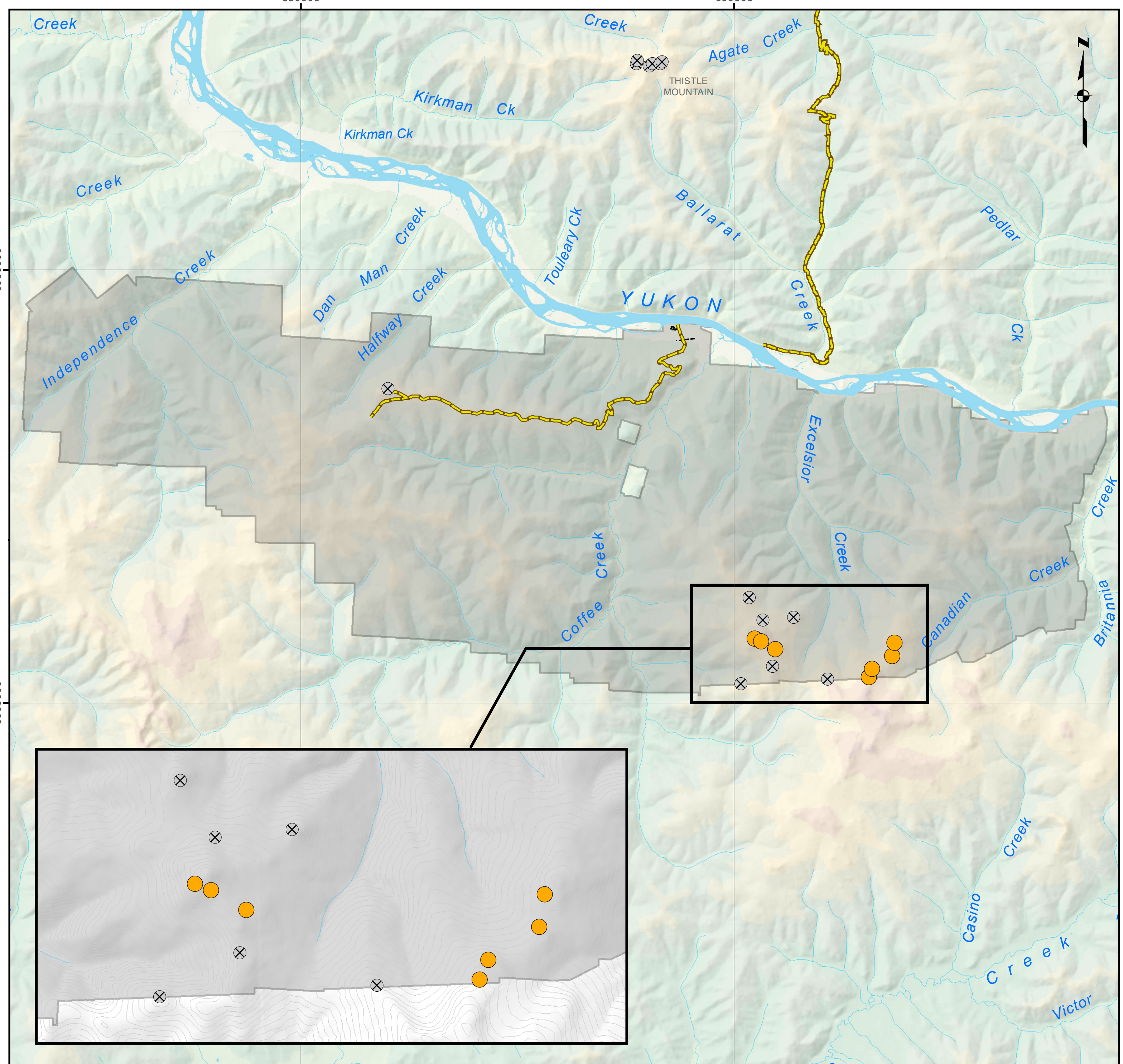

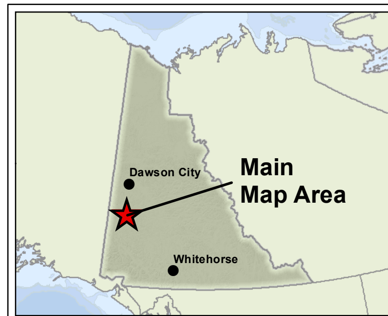

Legend

2015 Pika Survey Sites

- Pika Detected/Observed
- No Pika Detected/Observed
- Proposed Route
- Camp Roads/Airstrip
- Highway
- Coffee Property

FIGURE 11-2

2015 Pika survey effort and observations

Data Sources
1:250,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Model and 1:250,000 National Topographic Database (NTDB) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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12 SMALL MAMMAL TRAPPING

Small mammals that occur in the vicinity of the Project may include species of mice, vole, shrew, squirrel, and snowshoe hare. While none of these small mammals are a conservation concern federally or territorially, they remain ecologically important as prey species of larger carnivores, furbearers, and birds of prey. A small mammal trapping program was initiated to provide additional baseline data on species presence/absence as well as to provide samples for baseline small mammal tissue trace metals analysis.

Trace metals are defined as, "elements that occur in natural and perturbed environments in small amounts, and that, when present in sufficient bioavailable concentrations, are toxic to living organisms" (Adriano 2001). These trace metals include elements that may also be called micronutrients, since the uptake of these elements from the environment is a natural and required process (Adriano 2001, Barbour *et al.* 1998). Information on the baseline trace metal conditions will provide the basis for assessing if mining activities and processes increase the amount of trace metals found in soil, plants and small mammals in the area through fugitive dust deposition, combustion of fossil fuels or other means.

The following trace metals — arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium, uranium and zinc — have sources that may be encountered at the Coffee Property after development. The Canadian Council of Ministers of the Environment (CCME) has created the Canadian Environmental Quality Guidelines (CEQG) to assess contaminants (CCME 2006); however, there are currently no applicable tissue quality guidelines for trace metals in small mammals (i.e. red-backed vole). Trace metal levels can be compared over time to assess the effects of mine operations on small mammals.

12.1.1 METHODS

The small mammal trapping program was carried out at the Coffee Property from August 26–31, 2015. Three traplines were established in areas surrounding proposed Project infrastructure. Trapline 1 was located in the Coffee Creek valley just off the current airstrip and targeted lower elevation boreal forest habitat. Trapline 2 was established in the area of active exploration of the Coffee deposits which is characterized by subalpine shrub at a much higher elevation than Trapline 1. Trapline 2 lies within the proposed Project footprint and this trapline was intended to provide baseline species composition data as well as baseline trace metal contamination data. Trapline 3 was established in a subalpine shrub habitat approximately 5 km south of Trapline 2. Trapline 3 was intended to be a control for Trapline 2 and was located in an area with similar aspect, elevation, and vegetation characteristics. Figure 12-1 shows the locations of the three traplines in relation to the Project.

Small mammal trapping was conducted using the snap trapping methods described in the *British Columbia Resources Inventory Standards Committee Inventory Methods for Small Mammals* (Ministry of Environment 1998). Each trapline consisted of 20 stations, spaced at a minimum of 15 m intervals. At each station two traps were placed at least 2 m apart for a total of 40 traps per trapline. Victor Original snap traps baited with a peanut butter and oat mixture were used.

Each trapline was initially set in the afternoon and checked as soon as possible the following morning. All captures were recorded, removed and bagged for processing. Any misfired traps and traps that did not fire but had the bait missing were recorded as were missing traps and traps that appeared to have been raided by predators. All traps were reset and rebaited during each check. Traplines 1 and 2 were accessed by truck via existing Project roads. Due to the ease of accessibility these traplines were checked twice per day, in the morning and the evening, throughout the respective trapping periods. Trapline 3, due to its remote location was accessed by helicopter and only checked once per day, usually as early as possible in the morning.

The intended sample size was a maximum of 30 individuals per trapline. This sample size was determined in consultation with government biologists to provide sufficient capture data while limiting effects on the local small mammal populations. Different capture rates on the different traplines required the adjustment of trapping effort (i.e. number of nights) to avoid exceeding the sample size limit. Traplines 1 and 3 were run for four nights, while Trapline 2 was run for one night.

Weather conditions varied substantially during the study. It was generally wet and cool throughout the program with two nights of fresh snow on Trapline 3. One night of cold weather on Trapline 3, with wet snow, caused many traps to freeze, preventing them from triggering effectively. On the same night many traps (likely with captured small mammals) were lost to a predator. Based on the tracks present, the predator was likely an American marten.

Each specimen captured was placed into a Ziploc bag labelled with the location, time and date of captured. Standard morphological measurements were taken including total length, tail length, hind foot length, ear length, and weight. Sex and maturity of individuals was established based on weight, size, and the presence of mammaries. As it was late in the year some juvenile individuals born early in the summer may have reached a size where they were indistinguishable from adult males. Lactating adult females were much larger and heavier making them easily distinguishable. Some juveniles, likely born from later litters were clearly smaller and lighter. Once all measurements were completed samples were immediately frozen to preserve them for later laboratory analysis.

Laboratory analysis was conducted by ALS Environmental in Burnaby, BC. All known adults were analyzed for trace-metals. The remaining samples were from the largest individuals on each trapline. The entirety of each sample was homogenized and sub-sampled for analysis. Tissues were analyzed for moisture content gravimetrically by drying samples at 105 C for a minimum of six hours. Tissues were analyzed for trace metals following the British Columbia Lab Manual method *Metals in Animal Tissue and Vegetation (Biota) - Prescriptive* (B.C. Environmental Laboratory Technical Advisory Committee 2014). The trace metal results are provided in APPENDIX A.

12.1.2 RESULTS

A total of 75 small mammals and one bird were captured in the snap trapping program (Table 12-1). On Trapline 1, 13 northern red-backed voles (*Myodes rutilus*) and two deer mice (*Peromyscus maniculatus*) were captured over four nights. On Trapline 2, 28 red-backed voles were captured in one night and on Trapline 3, 32 red-backed voles and one White-crowned Sparrow were captured (*Zonotrichia leucophrys)* over 4 nights.

Table 12-1. Small mammal trapping effort and capture summary.

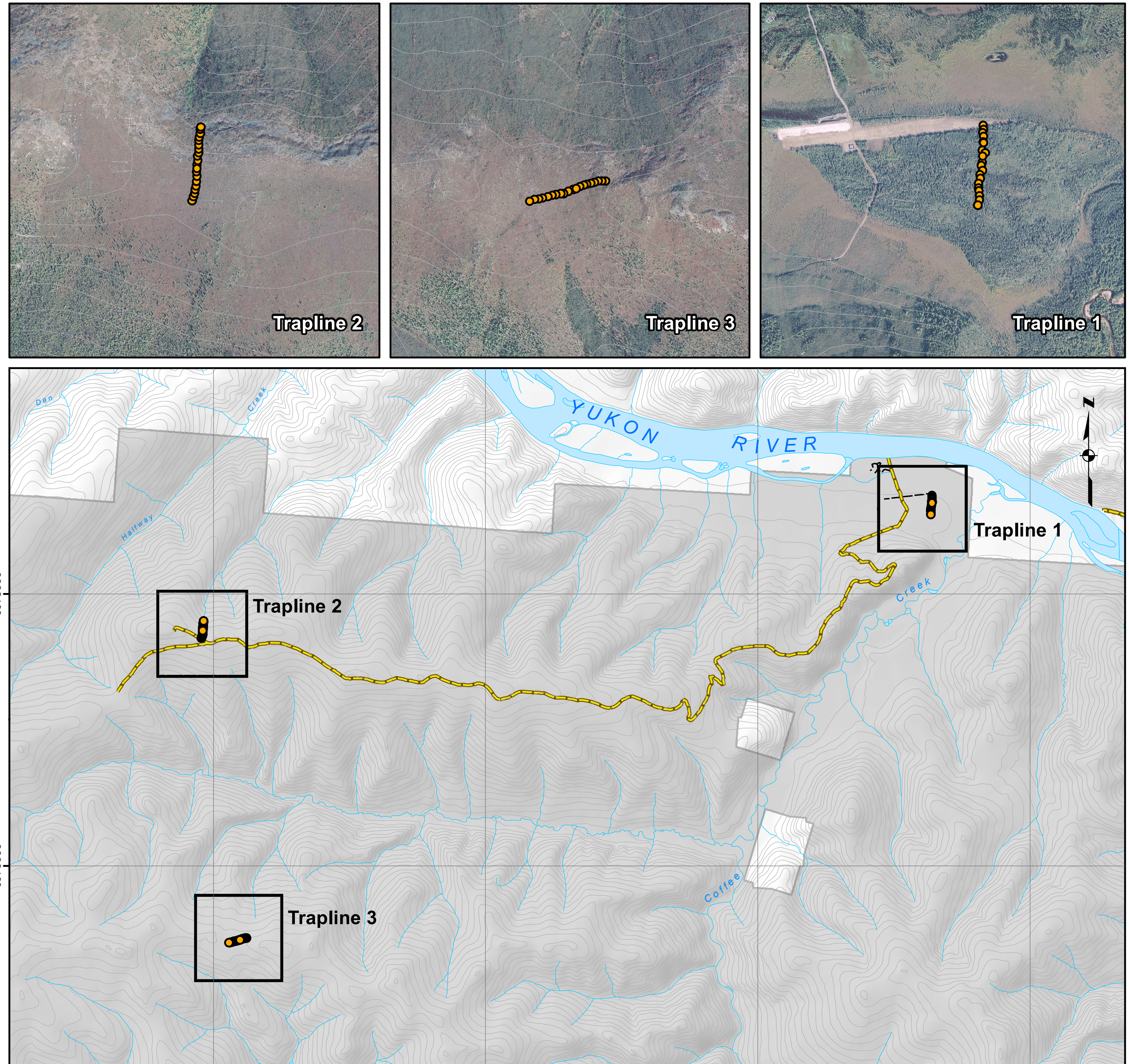
Trapline	Habitat	No. of Trap Nights	Red Backed Vole Capture	Deer Mouse Capture	Incidental Capture
1	Late seral spruce	160	13	2	None
2	Subalpine shrub	40	28	0	None
3	Subalpine shrub	160	32	0	1 White-crowned Sparrow

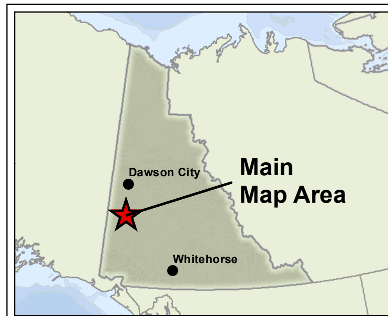
Results indicate that red-backed voles are present in both boreal and subalpine shrub habitats. The higher number of individuals captured on Traplines 2 and 3 indicate that red-backed voles may be more numerous in the subalpine shrub than in the lower elevation boreal forest. Deer mice were only captured on Trapline 1 in the low lying boreal forest and relatively few individuals were captured (n=2). No other small mammal species were captured.

Baseline trace metal results are provided in two tables in APPENDIX A: Small Mammal Trace Metal Results. A summary table by trapline of tissue metals concentrations for each species collected (detection limit, minimum, maximum, range, mean and 95UCLM) as well as the raw lab data are provided in APPENDIX A. For statistical purposes all data fields that were below detection limit were calculated at half the detection limit when calculating Mean and 95UCLM. Mean arsenic concentration in tissue was higher in samples collected on Trapline 2 (0.288 mg/kg dry weight) than Traplines 1 and 3 (0.121 mg/kg and 0.111 mg/kg respectively). Mercury concentrations were significantly higher at Traplines 2 and 3 (0.179 mg/kg and 0.128 mg/kg respectively) than Trapline 1 (0.061 mg/kg). Selenium at Trapline 1 was significantly higher (1.783 mg/kg) than Trapline 2 and 3 (0.806 mg/kg and 0.913 mg/kg respectively).

Table 12-2. Summary of trace metal results for small mammal trapping

Element	Trapline 1		Trapline 2		Trapline 3	
	Average	Range	Average	Range	Average	Range
Arsenic (mg/kg)	0.121	0.032-0.253	0.288	0.100-1.090	0.111	0.024-0.318
Cadmium (mg/kg)	0.335	0.223-0.502	0.688	0.183-1.460	0.973	0.249-2.780
Chromium (mg/kg)	0.343	0.064-0.828	0.330	0.193-0.500	0.396	0.103-1.890
Copper (mg/kg)	8.85	7.47-9.75	9.91	8.04-12.40	9.27	7.48-12.90
Lead (mg/kg)	0.067	0.028-0.172	0.076	0.041-0.140	0.081	0.040-0.181
Mercury (mg/kg)	0.061	0.027-0.143	0.179	0.068-0.283	0.128	0.100-0.166
Selenium (mg/kg)	1.783	1.110-2.640	0.806	0.641-1.060	0.913	0.691-1.440
Uranium (mg/kg)	0.0036	0.0020-0.0119	0.0058	0.0020-0.0189	0.0069	0.0020-0.0264
Zinc (mg/kg)	95.51	87.20-108.00	103.73	91.10-127.00	100.53	77.60-126.00





Legend

- Proposed Route
- Camp Roads/Airstrip
- Coffee Property
- Small Mammal Trapline Station

FIGURE 12-1

2015 Small mammal trapping locations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Model (30 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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13 ENVIRONMENTAL MONITORING PROGRAMS

EDI worked with Kaminak EMs to complete several studies to contribute to the wildlife field program throughout the summers of 2014, 2015, and 2016. Some of the surveys conducted by the Kaminak EMs were in conjunction with other studies run by EDI biologists and are described in the preceding sections (e.g. Section 8: Remote Camera Studies). The remaining surveys are described here. Kaminak EMs who worked on these programs included: Robert Farr, Andrew Taylor, Derek Scheffen, and Evan Warren.

13.1 PELLET REMOVAL PLOTS

A fecal pellet removal plot study was initiated in 2014 to monitor caribou use in the Project area. This study uses pellet removal techniques to study caribou habitat use and distribution. Similar methods have been used for various ungulates all over the world. The study at Coffee has been designed to be an ongoing annual program which will complement distribution data from other sources including collared animals and incidental animal sightings. The two main objectives of the pellet removal study are to 1) monitor changes in caribou use of the mine area over time and 2) to assess whether Project activities during construction and operation are affecting caribou use of the Project area.

13.1.1 METHODS

2014 Pellet Removal Plot Survey

In 2014, a total of 87 plots were preselected based on elevation and lichen data, and distance from the proposed Project footprint. UTM coordinates for each pre-selected plot were provided to the Kaminak EMs. At each plot location, two 50 m^2 subplots were created by establishing two circular plots with a radius of 3.99 m. Each subplot was established five metres north and south, respectively, of the preselected coordinates. Each subplot was examined systematically and thoroughly and any caribou pellets or scat were recorded. All fecal material was then removed completely from the plot area. Photos of the area were taken and a simple habitat description was completed including general vegetation community and estimated percent cover for lichen. Of the 87 pre-selected plots, 60 were surveyed in 2014 (Figure 13-1).

2015 Pellet Removal Plot Survey

In 2015, the EMs resampled the plots surveyed in 2014 and, when time allowed, initiated additional plots from the 87 preselected locations provided in 2014 with a focus on increasing the number of plots at further distances from the proposed Project footprint (i.e. 4 km, 7 km and 10 km). In 2015, a total of 76 plots were surveyed; 54 of these plots were surveyed in 2014. An additional 22 plots were surveyed for the first time in 2015. Plot locations for the 2015 study are shown in Figure 13-2.

2016 Pellet Removal Plot Survey

In 2016, a total of 85 plots were surveyed, including resampling all of the plots surveyed in 2014 and 2015. Of the plots surveyed in 2016, six of the plots had previously been surveyed only in 2014, 22 plots were only surveyed in 2015, and 70 plots were surveyed in both 2014 and 2015. An additional three plots were surveyed for the first time in 2016.

13.1.2 RESULTS

2014 Pellet Removal Plot Survey

Results of pellet removal surveys are stratified by distance from the proposed footprint (Table 13-1). Highlights of the 2014 results include:

- Caribou pellets were found in 20% of the plots (12 of the 60 plots surveyed).
- The average number of pellet groups per plot was found to be 0.25.

Figure 13-1 displays the plots surveyed and the pellet groups found in relation to the Coffee Property.

Table 13-1. 2014 pellet plot results by distance from proposed footprint

Distance from PDA	Number of Plots	Number of Plots Containing Pellet Groups	Plots Containing Pellet Groups (%)	Total Number of Pellet Groups (Summed)	Number of Pellet Groups per Plot
100 m	11	2	18	2	0.18
250 m	12	2	17	3	0.25
1 km	10	2	20	2	0.20
2.5 km	12	2	17	4	0.33
4 km	7	2	29	2	0.29
7 km	8	2	25	2	0.25
10 km	0	-	-	-	-
Total	**60**	**12**	**20**	**15**	**0.25**

2015 Pellet Removal Plot Survey

In 2015, a total of 76 sites were visited (22 for the first time, and 54 a repeat of the 2014 sites). Highlights of the 2015 results include:

- Of the pellet removal plots initiated in 2014 and resampled in 2015 (n=54), caribou pellets were found in 11% of the plots (6 plots) with an average of 0.13 pellet groups per plot.
- Of the pellet removal plots surveyed for the first time in 2015 (n=22), caribou pellets were found in 27% of the plots (6 plots) with an average of 0.68 pellet groups found per plot.

The 2015 results from those sites surveyed in both 2014 and 2015 can be found in Table 13-2. Table 13-3 summarizes the results of those plots initiated in 2015. Figure 13-2 summarizes the 2015 pellet removal plot results from 2014 and 2015.

Table 13-2. 2015 pellet plot results by distance from proposed Project for plots cleared the previous year

Distance from PDA	Number of Plots	Number of Plots Containing Pellet Groups	Plots Containing Pellet Groups (%)	Total Number of Pellet Groups (Summed)	Number of Pellet Groups per Plot
100 m	10	1	10	1	0.10
250 m	12	0	0	0	0.00
1 km	10	1	10	1	0.10
2.5 km	11	2	18	3	0.27
4 km	7	2	29	2	0.29
7 km	4	0	0	0	0.00
10 km	0	N/A	N/A	N/A	N/A
Total	**54**	**6**	**11**	**7**	**0.13**

Table 13-3. 2015 pellet plot results by distance from proposed Project for plots surveyed for the first time in 2015

Distance from PDA	Number of Plots	Number of Plots Containing Pellet Groups	Plots Containing Pellet Groups (%)	Total Number of Pellet Groups (Summed)	Number of Pellet Groups per Plot
100 m	3	1	33	1	0.33
250 m	3	0	0	0	0.00
1 km	0	N/A	N/A	N/A	N/A
2.5 km	0	N/A	N/A	N/A	N/A
4 km	3	0	0	0	0.00
7 km	3	0	0	0	0.00
10 km	10	5	50	14	1.40
Total	**22**	**6**	**27**	**15**	**0.68**

2016 Removal Plot Survey

In 2016, a total of 85 sites were visited (76 a repeat of 2015 sites, three surveyed for the first time in 2016, and six sites that were surveyed in 2014 but not in 2015). The 2016 results are summarized in Table 13-4 and Table 13-5. Highlights of the 2016 results include:

- Of the pellet plots cleared during the previous year (n=76), caribou pellets were found in 25% of the plots (19 plots) with an average of 0.50 pellet groups per plot.
- Of the pellet plots sampled in 2014 and 2016 (n=6), caribou pellets were found in 50% of the plots (3 plots) with an average of 0.50 pellet groups per plot. No caribou pellets were found in the pellet plots sampled for the first time in 2016 (n=3).

Table 13-4. 2016 pellet plot results by distance from proposed Project for plots cleared the previous year[1]

Distance from PDA	Number of Plots	Number of Plots Containing Pellet Groups	Plots Containing Pellet Groups (%)	Total Number of Pellet Groups (Summed)	Number of Pellet Groups per Plot
100 m	13	1	7	1	0.08
250 m	15	0	0	0	0
1 km	10	4	40	7	0.70
2.5 km	11	4	36	7	0.64
4 km	10	3	30	5	0.50
7 km	7	3	43	12	1.71
10 km	10	4	40	5	0.50
Total	**76**	**19**	**25**	**37**	**0.50**

[1] Includes 54 plots sampled in all three years (2014, 2015 and 2016) and 22 plots sampled in both 2015 and 2016.

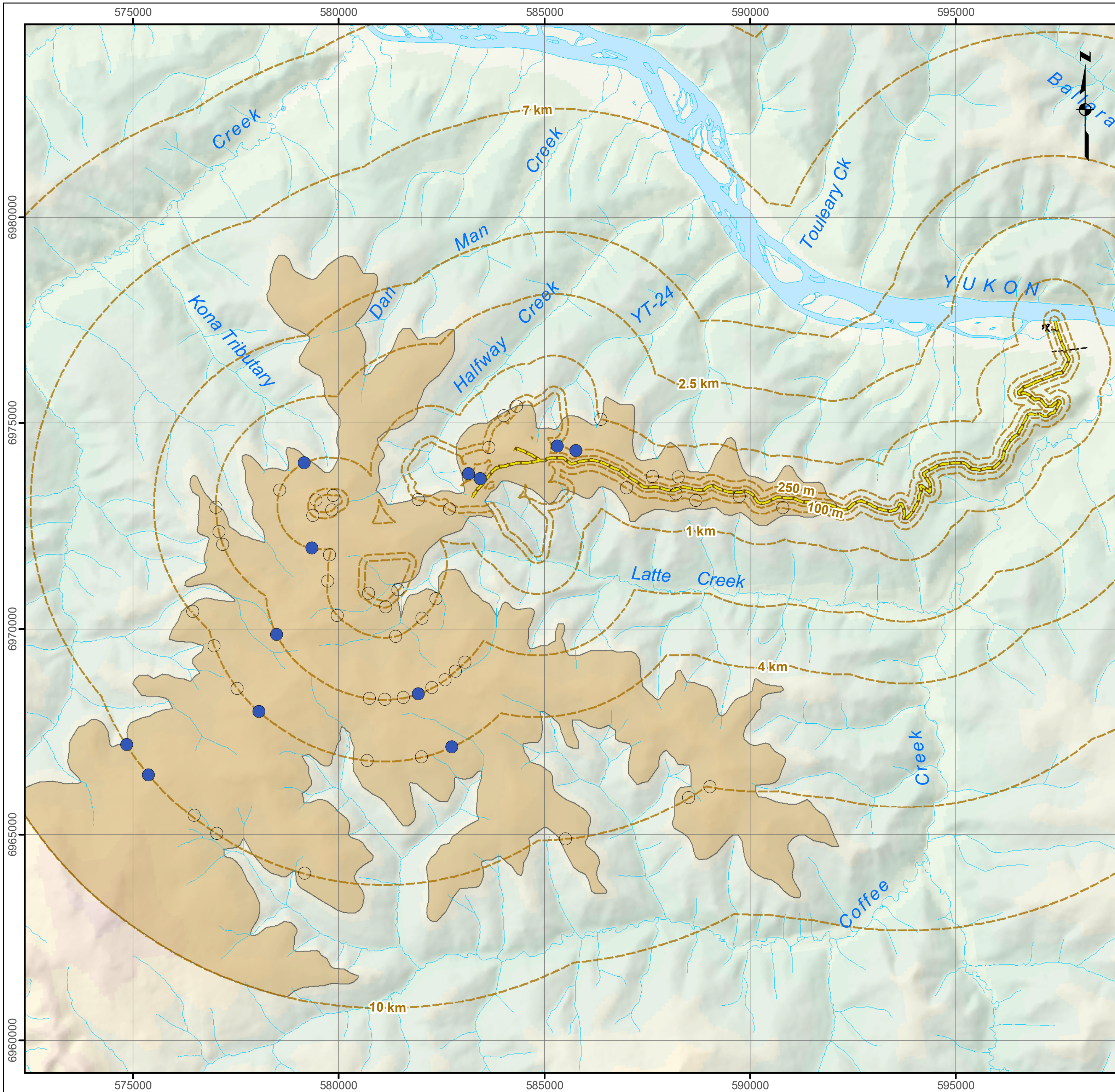
Table 13-5. 2016 pellet plot results by distance from proposed Project for plots not cleared the previous year[1]

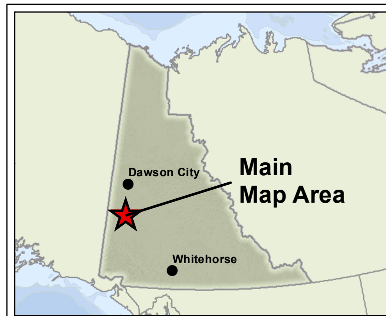
Distance from PDA	Number of Plots	Number of Plots Containing Pellet Groups	Plots Containing Pellet Groups (%)	Total Number of Pellet Groups (Summed)	Number of Pellet Groups per Plot
100 m	1	0	0	0	0
250 m	0	N/A	N/A	N/A	N/A
1 km	0	N/A	N/A	N/A	N/A
2.5 km	3	1	33	1	0.33
4 km	0	N/A	N/A	N/A	N/A
7 km	5	2	40	2	0.40
10 km	0	N/A	N/A	N/A	N/A
Total	**6**	**3**	**50**	**3**	**0.50**

[1] Includes 6 plots that were surveyed in 2014 and 2016 (but not 2015) and 3 plots that were surveyed for the first time in 2016.

Combined Results

Although no statistical analysis has been completed on the results at this time, comparison of the annual pellet plot survey results suggest that there is a difference in caribou use of the study area between years: for example, for 2015, of the plots that had been cleared the previous year, 11% contained pellet groups with an average of 0.13 pellet groups per plot, while for 2016, of plots that had been cleared the previous year, 25% had pellet groups with an average of 0.50 pellet groups per plot. These differences are consistent with data from the late winter aerial surveys (Section 3) and from GPS collar data which indicate that Fortymile caribou were present in the study area in much lower numbers during the winter of 2014/2015 than the winter of 2015/2016.





Legend

Caribou Pellet Groups

- Pellet Groups Present
- Pellet Groups Absent
- Proposed Route
- Camp Roads/Airstrip
- Distance from Proposed Footprint
- Subalpine Habitat

FIGURE 13-1

2014 Pellet removal plot survey effort and pellet group locations

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Model (30 m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

Project data displayed is site specific. Data collected by EDI (2014) was obtained using Garmin GPS technology.

Disclaimer
This document is not an official land survey and the spatial data presented is subject to change.

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Map Reference Scale: 1:130,000 (Printed at 8.5 x 11)
Coordinate System: NAD 1983 UTM Zone 7N

Drawn: LG	Checked: AM/LP	Date: 2/24/2017

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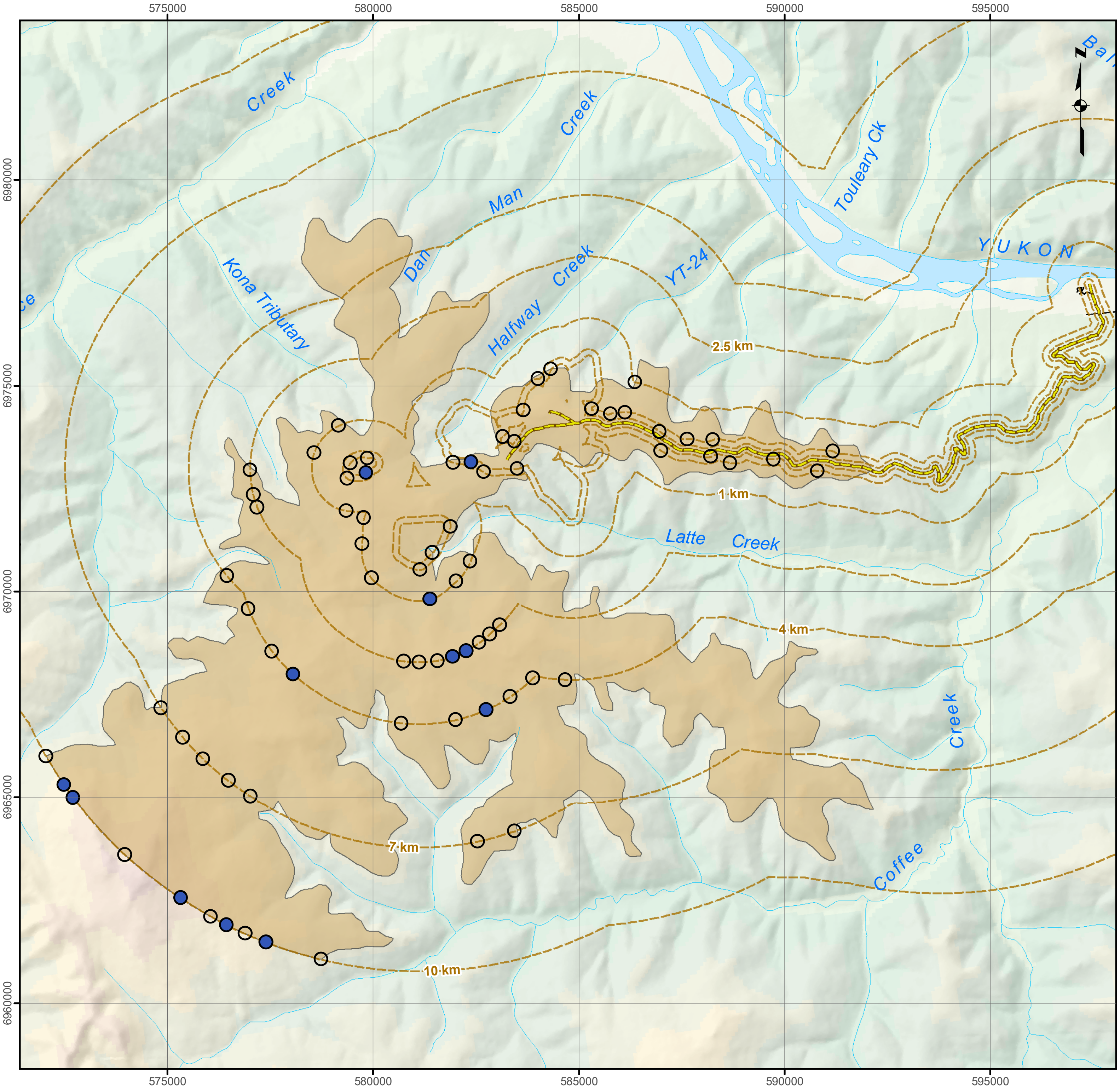

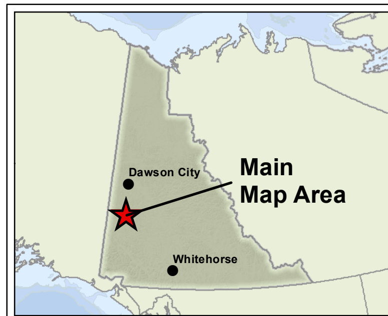

Legend

Proposed Route

Camp Roads/Airstrip

Caribou Pellet Groups

Pellet Groups Present

Pellet Groups Absent

Distance from Proposed Footprint

Subalpine Habitat

FIGURE 13-2

2015 Pellet removal plot survey effort and pellet group locations

Data Sources
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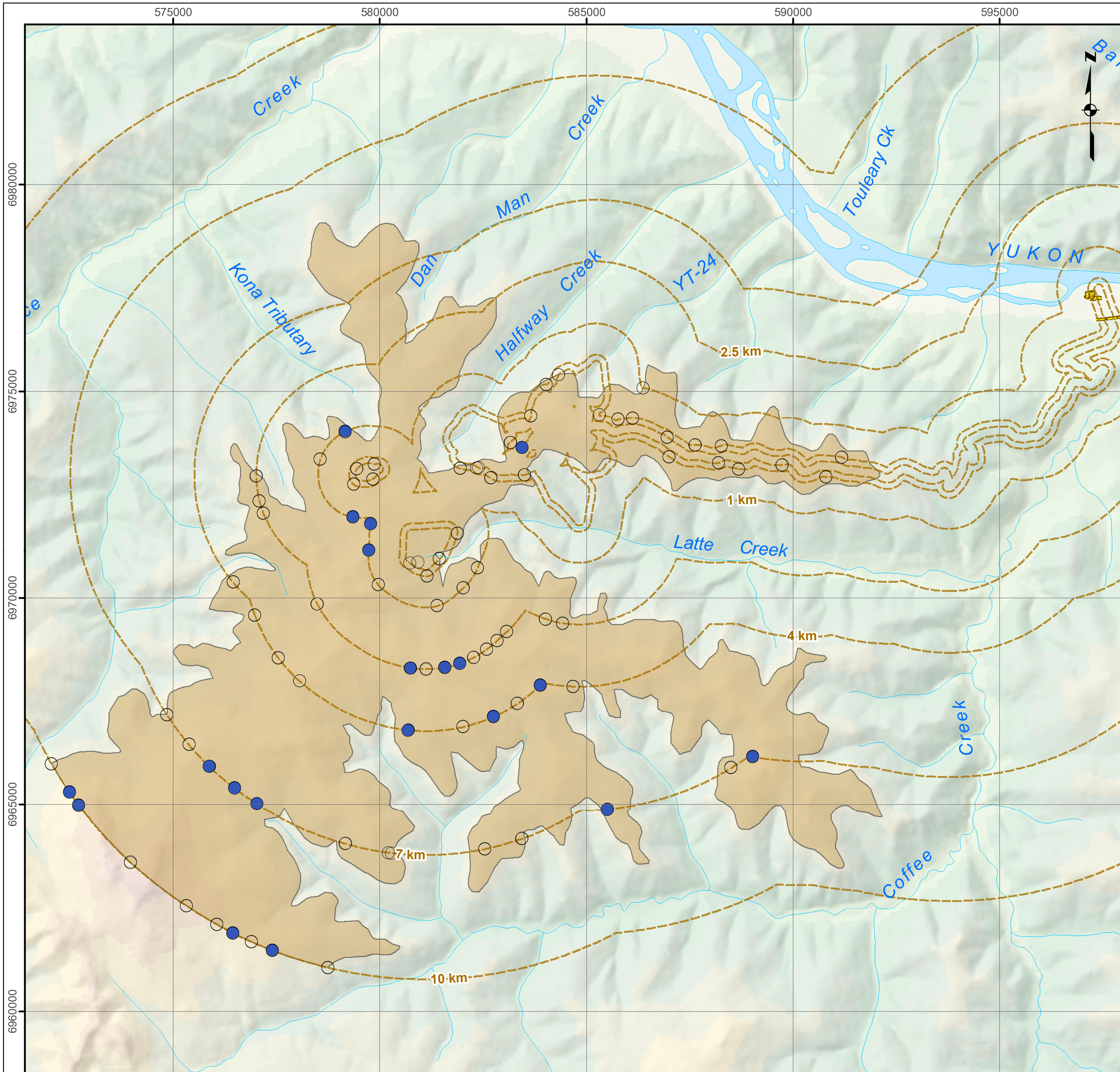

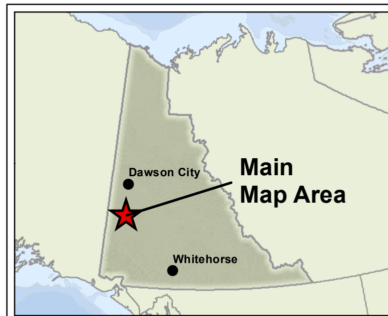

Legend

Caribou Pellet Groups

- Pellet Groups Present
- Pellet Groups Absent
- Proposed Route
- Camp Roads/Airstrip
- Distance from Proposed Footprint
- Subalpine Habitat

FIGURE 13-3

2016 Pellet removal plot survey effort and pellet group locations

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13.2 CARIBOU PELLET COLLECTION AND DIETARY ANALYSIS STUDY

The purpose of caribou pellet collection and dietary analysis study was to determine the composition of forage plants in the winter diets of the Fortymile caribou herd occupying the Project area. This knowledge will provide data to determine winter habitat use and vegetation preference.

13.2.1 METHODS

This study involved opportunistic sampling of fecal pellet material from areas surrounding the Coffee Project. Kaminak EMs collected samples of pellet groups found in all areas they worked in during the summer of 2014. When pellet groups were observed they were placed into small brown paper bags, and stored in a covered area to allow pellets to dry and prevent further decomposition. At each collection site UTM coordinates, elevation, and habitat type was recorded.

For the analysis of caribou pellets, five zones were created in order to spatially stratify the results (Figure 13-4). All five zones are located within the winter habitat of the Fortymile herd and the summer range of the Klaza herd. However, the four zones (Zones 1 to 4) located west of the Coffee Creek drainage are on the periphery of the Klaza range, and incidental sightings from the camp wildlife log and wildlife surveys in the area have only documented the occasional Klaza caribou. In contrast, collar data and winter survey data indicate that a portion of the Fortymile herd spent the preceding winter (winter 2013/2014) in this area. Since the fecal sampling targeted newer pellets, the pellets collected in these four zones are believed to represent the winter diet of the Fortymile caribou. One zone (Zone 5) east of the Coffee Creek drainage was included for comparison — this area was also used by Fortymile caribou the preceding winter; however, survey data and incidental sightings suggest that Klaza caribou use this area more frequently than the other zones. Therefore, pellets collected from Zone 5 may represent a combination of Fortymile and Klaza caribou.

A composite sample from each zone was created from the pellets collected in that area by selecting two individual pellets from each pellet group sampled within each zone. Composite samples were shipped to the Wildlife Habitat/Nutrition Lab at Washington State University in Pullman, WA. The lab performed a Level A dietary analysis with 150 slide views per composite sample (Davitt 2015).

13.2.2 RESULTS

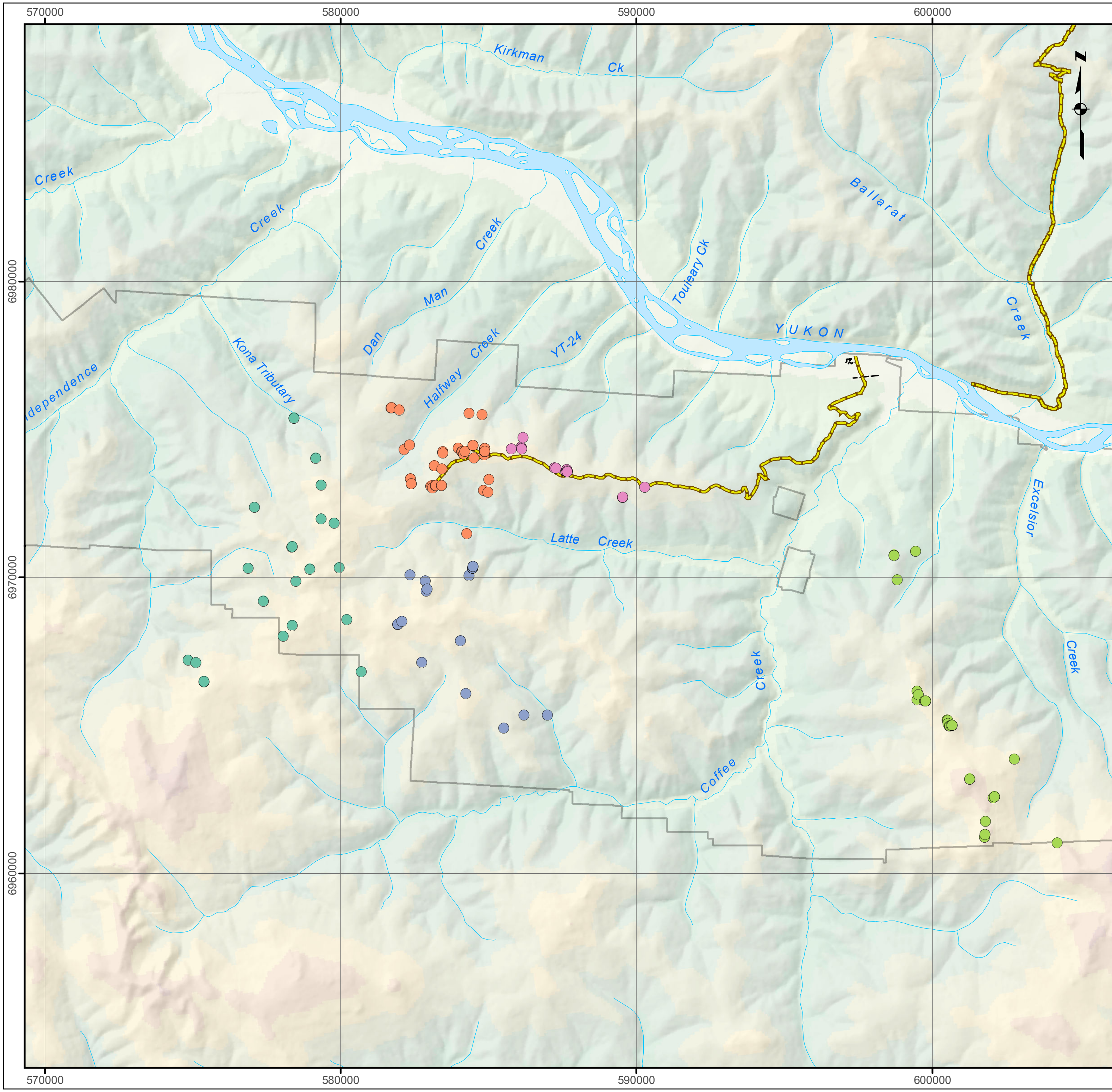
A total of 135 pellet groups from all areas of the Project were collected. Figure 13-4 shows the locations of all pellet groups collected as well the analysis zones. In all subzones, lichens made up the majority of caribou diet ranging from 63.6% to 72.8% (Table 13-6). Mosses also made up a significant proportion ranging from 9.5% to 24.9%. Equisetum represented between 2.5% and 11% of plant fragments identified. Graminoids, shrubs, and forbs were identified in most samples but made up smaller percentages of the diet.

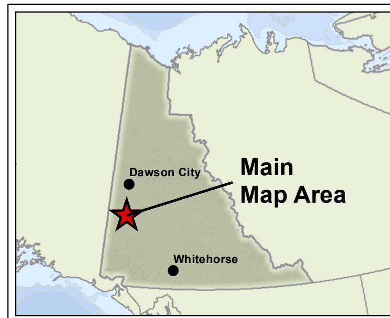
Table 13-6. Forage plant species (%) present in caribou fecal pellet samples from five zones in the Coffee Project area.

Plants	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5	
Aulacomnium Moss	0.6				1.0		0.5		1.2	
Polytrichum Moss	1.4		0.9		0.7		0.2		0.8	
Sphagnum moss			1.9						0.3	
Classic Moss	17.3		15.0		18.1		8.8		22.6	
Total Mosses:	19.3		17.8		19.8		9.5		24.9	
Clubmoss										
Lycopodium	0.0		0.0		0.5		0.0		0.0	
Alectoria	13.7		8.1		4.6		10.4		7.8	
Cetraria/Dactylina	3.4		7.1		5.6		2.1		7.5	
Cladina/Cladonia	43.8		46.3		46.0		55.5		41.2	
Nephroma	1.1		0.2		0.8		0.7		1.2	
Peltigera	6.3		5.4		6.6		3.6		5.0	
Stereocaulon	0.3		0.3				0.5		1.9	
Total Lichens:	68.6		67.4	%	63.6	%	72.8	%	64.6	%
Horsetails										
Equisetum	4.9	%	6.5	%	5.6	%	11.0	%	2.5	%
Agrostis							1.6			
Arctagrostis	0.1									
Bromus									0.5	
Calamagrostis			2.0		0.5		0.3		0.3	
Carex	2.0		1.2		3.0		0.7		2.0	
Festuca			1.1				0.5			
Poa	0.8		0.6		2.6		1.4		0.5	
Total Graminoids:	2.9	%	4.9	%	6.1	%	4.5	%	3.3	%
Betula stem									0.6	
Cassiope leaf									0.3	
Cassiope stem									0.5	
Cornus stem	1.1									
Dryas leaf	0.3									
Dryas stem	0.6									
Empetrum leaf	1.2		1.3				0.7			
Ledum leaf	0.2		0.6		0.7				0.2	
Ledum stem									0.6	
Rhododendron leaf	0.3									
Salix leaf			0.9		1.5		1.2		0.3	
Salix stem			0.3		1.6				1.6	
Shepherdia leaf					0.3					
Vaccinium stem	0.3									
Shrub leaf					0.3				0.3	
Total Shrubs:	4.0	%	3.1	%	4.4	%	1.9	%	4.4	%

Table 13-6. Forage plant species (%) present in caribou fecal pellet samples from five zones in the Coffee Project area.

Plants	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5	
Artemisia leaf							0.3			
Astragalus									0.2	
Geum	0.3									
Potentilla			0.3							
Other Forbs									0.1	
Total Forbs:	0.3	%	0.3	%	0.0	%	0.3	%	0.3	%
TOTAL	100.0	%	100.0	%	100.0	%	100.0	%	100.0	%





Legend

Proposed Route

Camp Roads/Airstrip

Coffee Property

Fecal Pellet Group Sampling Location (By Zone)

1

2

3

4

5

FIGURE 13-4

2014 Fecal pellet group sampling locations and analysis zones

Data Sources
Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Digital Elevation Models (30 m and 90m) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

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13.3 JAVA ROAD WILDLIFE TRAIL INVESTIGATIONS

The purpose of the Java Road wildlife trail investigation study was to document wildlife use surrounding the Java Road, with a primary focus on wildlife trails crossing the Java Road.

13.3.1 METHODS

Kaminak EMs conducted wildlife trail surveys along the entire length of the Java Road between March 7 and June 30, 2014. Transects of approximately 500 m in length were established and recorded by marking GPS waypoints at the start and end of each. Transects were parallel to the road, approximately 5–10 m into forest to allow for better detection of wildlife sign/trails. The length of each transect was surveyed by foot, with Kaminak EMs searching for any wildlife or wildlife sign. All wildlife sign was recorded for each 500 m segment including pellets, scat, tracks, and trails. For all wildlife trails found, information collected includes location, the intensity of use (light/medium/heavy), and the direction of the trail.

13.3.2 RESULTS

The results of the study found that most wildlife trails were located in the lower elevation areas within the first several kilometers of the Java Road (Figure 13-5). The Yukon River valley likely acts as a corridor for wildlife movement in the larger regional context and so this result is not surprising. All trails found were deemed to be of light and medium intensity. A strong directional trend for the trails was not observed. Other than wildlife trails, survey observations included wildlife sign from caribou, moose, bear, red squirrel, snowshoe hare, grouse, orange-crowned warbler and other bird species.

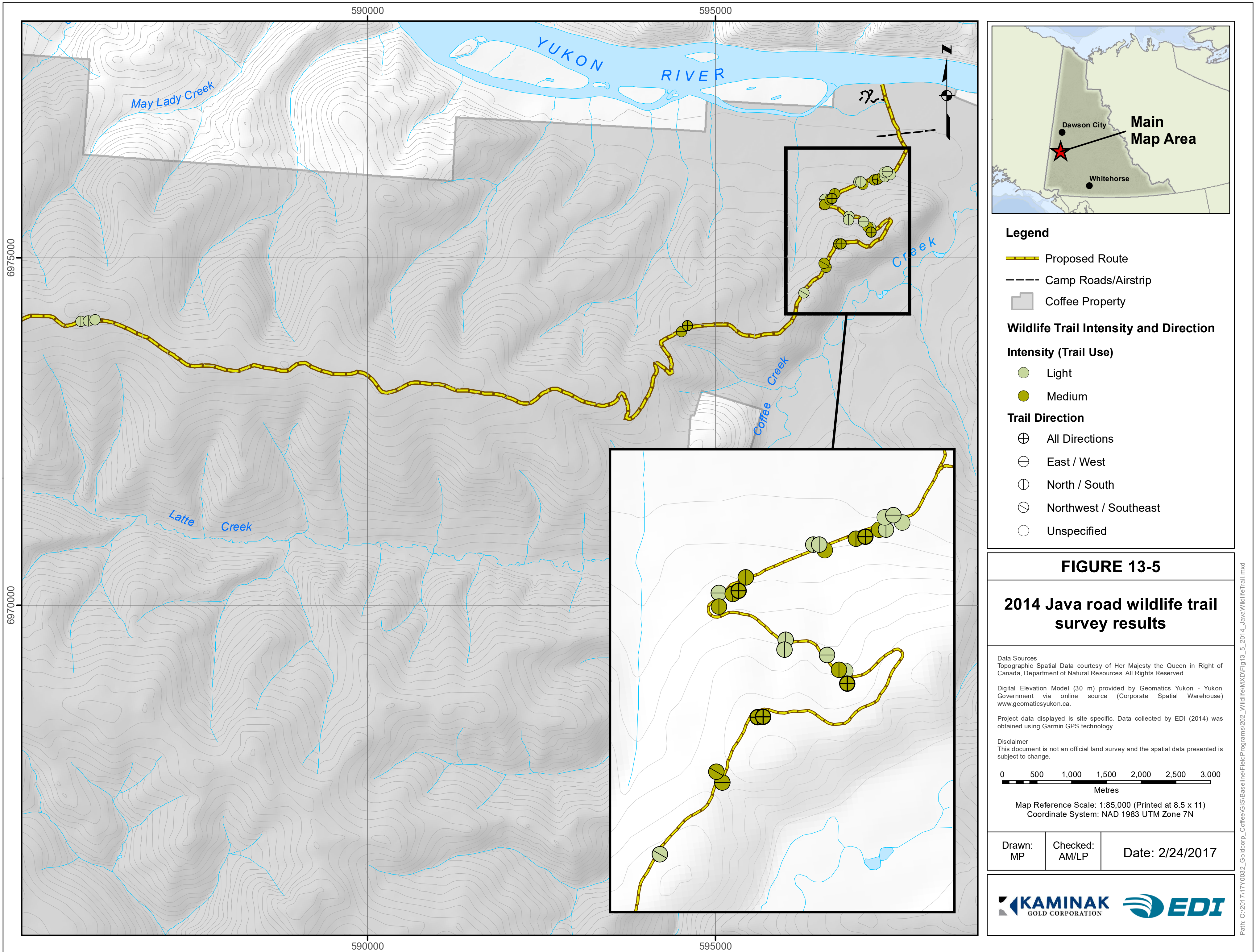

FIGURE 13-5

2014 Java road wildlife trail survey results

13.4 CAMP WILDLIFE LOG

The Camp Wildlife Log for the Coffee Camp was established in 2010 and is ongoing when exploration activities are underway in the Coffee Property. The purpose of the wildlife log is to document wildlife presence in the Project area and document any interactions with Project personnel and facilities. This information will help inform Project planning and mitigation.

13.4.1 METHODS

Site personnel are asked to record all wildlife sightings in the camp's Wildlife Log. Kaminak EMs collected these reports and entered them into a database to track wildlife observations. For each wildlife sighting, the following information was collected: date of observation, time, observer, location, weather conditions, species, number of animals observed, sex/maturity, estimated distance from personnel/facilities, behaviour/activity, wildlife reaction, direction of movement, and description of encounter. The incidental wildlife log covers the following time periods:

- June 7 to October 8, 2010
- April 15 to October 9, 2011
- February 21 to August 10, 2013
- May 12 to October 7, 2014
- January 18 to August 28, 2015
- March 19 to November 4, 2016

13.4.2 RESULTS

The Camp Wildlife Log provides an indication of the wildlife species that occur in proximity to proposed Project infrastructure, particularly within the Coffee Property, although observations were made throughout the entire RSA. Wildlife species recorded in the Camp Wildlife Log are summarized in Table 13-7. In addition to those species listed, a number of birds were also recorded on the Wildlife Log including Bald Eagle, Golden Eagle, Great Grey Owl, Short-eared Owl, Northern Goshawk, Red-tailed Hawk, Peregrine Falcon, Common Raven, Sandhill Crane, Spruce Grouse, Willow Ptarmigan, and American Robin as well as a number of bird observations not identified to species including falcon, hawk, owl, grouse, ptarmigan, duck, swan, sandpiper, and woodpecker.

Eighteen different species of mammal and one species of amphibian were recorded in the Camp Wildlife Log between 2010 and 2016. The most commonly recorded species in the Camp Wildlife Log were black bear and moose; combined these two species represent almost 70% of the observations recorded in the log. Notable observations within the Camp Wildlife Log include:

- Caribou — 21 observations for a total of 62 caribou were recorded in the Log between 2010 and 2016. Most observations were of single animals or small groups of two to five caribou. One larger group of 17 caribou was noted near the proposed mine site on September 20, 2010, and a group of 15+ caribou was observed near the Kona deposit on August 28, 2016. All caribou observations in the Camp Wildlife Log were recorded between May 12 and November 8.

- Moose — 115 observations for a total of 166 moose were documented in the Log including 22 observations of cow moose with one or two calves.
- Mule deer — mule deer were observed along the lower sections of the Java Road on two separate occasions in August 2016.
- Thinhorn sheep — four observations totalling eight thinhorn sheep were recorded in the Log. Three of these observations were of groups of sheep (ranging in size from one to four sheep) along the bluffs on the north side of the Yukon River; the forth observation was of three sheep walking along the slopes near the Kona deposit in June 2016. There are no cliffs or other steep slopes that could provide escape terrain for thinhorn sheep in the vicinity of the Kona deposit, and subsequent searches for sheep in this area conducted by the Kaminak EMs did not locate the animals.
- Black bear — 149 observations for a total of 196 black bears were documented in the Log including more than 25 observations of females with one or two young.
- Grizzly bear — 15 grizzly bear observations were made totalling 18 bears. Most of these observations were of single animals; however, a grizzly sow and cub were observed on a couple of occasions.
- Grey wolves — eight observations of wolves totalling 11 animals were recorded in the Log.

It should be noted that the number of animals observed is often related to the level of activity, or amount of time spent onsite during that year; therefore comparisons between years or locations may not be valid. Additionally, observations recorded in the Camp Wildlife Log tend to be biased towards the larger, more charismatic wildlife species. However, the information documented in the Log does provide valuable information on seasonality and trends for some of these species.

Table 13-7. Summary of wildlife reported in the Camp Wildlife Log 2010–2016

Species[1]	Number of Animals Observed by Year						
	2010	**2011**	**2013**	**2014**	**2015**	**2016**	**Total**
Caribou	19	5	1	3	6	28	62
Moose	8	16	6	42	32	62	166
Mule Deer	-	-	-	-	-	3	3
Thinhorn Sheep	-	-	-	4	1	3	8
Black Bear	1	5	22	28	38	99	196
Grizzly Bear	1	1	1		7	8	18
Bear Sp.	-	-	9	6		1	16
Wolf	-	-	1	2	6	2	11
Red Fox	-	-	-	1	-	-	1
Cougar[1]	-	1	-	-	-	-	1
Lynx	-	-	-	-	1	3	4
Cat Sp.	-	-	1	-	-	-	1
Ermine	-	-	-	-	-	1	1
American Marten	-	-	3	-	4	2	9
River Otter	-	-	-	-	-	4	4
Weasel Sp.	-	-	-	1	-	3	4
Beaver	1	-	-	2	-	-	3
Lemming	-	1	-	-	-	-	1
Porcupine	-	-	1	3	4	12	20
Snowshoe Hare	-	-	-	-	1	-	1
Mouse	-	1	-	-	-	-	1
Frog	-	-	-	-	2	3	5
Total	**30**	**30**	**45**	**92**	**102**	**234**	**536**

[1] The study area is within the reported range of cougars; however, the species is considered rare in Yukon (Environment Yukon 2017). No photo or other documentation was available to provide confirmation of this reported sighting.

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APPENDIX A. SMALL MAMMAL TISSUE TRACE METAL RESULTS

	Parameter	Aluminum (Al)-Total	Antimony (Sb)-Total	Arsenic (As)-Total	Barium (Ba)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	2.0	0.010	0.020	0.050
Trapline 1	Min	13.4	0.082	0.032	16.900
	Max	222.0	0.843	0.253	29.400
	Range	13.4 - 222	0.082 - 0.843	0.032 - 0.253	16.9 - 29.4
	Mean	55.4	0.306	0.121	22.814
	95UCLM	110.0	0.500	0.185	26.316
Trapline 2	Min	11.7	0.054	0.100	27.500
	Max	98.5	0.288	1.090	118.000
	Range	11.7 - 98.5	0.054 - 0.288	0.1 - 1.09	27.5 - 118
	Mean	37.8	0.120	0.288	52.867
	95UCLM	52.7	0.160	0.438	68.726
Trapline 3	Min	4.4	<0.010	0.024	32.300
	Max	134.0	0.708	0.318	137.000
	Range	4.4 - 134	<0.010 - 0.708	0.024 - 0.318	32.3 - 137
	Mean	46.1	0.165	0.111	64.383
	95UCLM	71.1	0.300	0.164	80.543

	Parameter	Beryllium (Be)-Total	Bismuth (Bi)-Total	Boron (B)-Total	Cadmium (Cd)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	0.010	0.010	1.0	0.0050
Trapline 1	Min	<0.010	<0.010	1.8	0.2230
	Max	<0.010	0.024	2.8	0.5020
	Range	-	<0.010 - 0.024	1.8 - 2.8	0.223 - 0.502
	Mean	-	0.007	2.3	0.3351
	95UCLM	-	0.011	2.6	0.4158
Trapline 2	Min	<0.010	<0.010	<1.0	0.1830
	Max	<0.010	0.029	2.9	1.4600
	Range	-	<0.010 - 0.029	<1.0 - 2.9	0.183 - 1.46
	Mean	-	0.008	1.7	0.6878
	95UCLM	-	0.012	2.1	0.9238
Trapline 3	Min	<0.010	<0.010	<1.0	0.2490
	Max	<0.010	0.032	3.6	2.7800
	Range	-	<0.010 - 0.032	<1.0 - 3.6	0.249 - 2.78
	Mean	-	0.008	1.4	0.9728
	95UCLM	-	0.012	2.0	1.3841

	Parameter	Calcium (Ca)-Total	Cesium (Cs)-Total	Chromium (Cr)-Total	Cobalt (Co)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	20	0.0050	0.050	0.020
Trapline 1	Min	24900	0.1580	0.064	0.064
	Max	42500	0.7310	0.828	0.278
	Range	24900 - 42500	0.158 - 0.731	0.064 - 0.828	0.064 - 0.278
	Mean	33614	0.4516	0.343	0.138
	95UCLM	37719	0.6346	0.551	0.195

	Parameter	Calcium (Ca)-Total	Cesium (Cs)-Total	Chromium (Cr)-Total	Cobalt (Co)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	20	0.0050	0.050	0.020
Trapline 2	Min	20300	0.7460	0.193	0.156
	Max	44500	5.1400	0.500	0.408
	Range	20300 - 44500	0.746 - 5.14	0.193 - 0.5	0.156 - 0.408
	Mean	32267	2.2113	0.330	0.232
	95UCLM	36678	2.8572	0.387	0.272
Trapline 3	Min	12500	0.6940	0.103	0.107
	Max	44100	3.5900	1.890	0.435
	Range	12500 - 44100	0.694 - 3.59	0.103 - 1.89	0.107 - 0.435
	Mean	24717	2.1303	0.396	0.224
	95UCLM	29728	2.7233	0.672	0.274

	Parameter	Copper (Cu)-Total	Iron (Fe)-Total	Lead (Pb)-Total	Lithium (Li)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	0.10	3.0	0.020	0.50
Trapline 1	Min	7.47	233.0	0.028	<0.50
	Max	9.75	542.0	0.172	<0.50
	Range	7.47 - 9.75	233 - 542	0.028 - 0.172	-
	Mean	8.85	307.3	0.067	-
	95UCLM	9.51	387.4	0.103	-
Trapline 2	Min	8.04	232.0	0.041	<0.50
	Max	12.40	414.0	0.140	<0.50
	Range	8.04 - 12.4	232 - 414	0.041 - 0.14	-
	Mean	9.91	306.4	0.076	-
	95UCLM	10.70	338.6	0.093	-
Trapline 3	Min	7.48	202.0	0.040	<0.50
	Max	12.90	445.0	0.181	<0.50
	Range	7.48 - 12.9	202 - 445	0.04 - 0.181	-
	Mean	9.27	297.4	0.081	-
	95UCLM	10.27	341.6	0.107	-

	Parameter	Magnesium (Mg)-Total	Manganese (Mn)-Total	Mercury (Hg)-Total	Molybdenum (Mo)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	2.0	0.050	0.0050	0.020
Trapline 1	Min	1350.0	9.240	0.0265	0.636
	Max	1780.0	26.900	0.1430	0.850
	Range	1350 - 1780	9.24 - 26.9	0.0265 - 0.143	0.636 - 0.85
	Mean	1552.9	13.607	0.0607	0.740
	95UCLM	1673.7	18.149	0.0903	0.799
Trapline 2	Min	1230.0	24.600	0.0675	0.430
	Max	1690.0	99.400	0.2830	0.737
	Range	1230 - 1690	24.6 - 99.4	0.0675 - 0.283	0.43 - 0.737
	Mean	1479.2	52.292	0.1786	0.591
	95UCLM	1565.3	67.530	0.2155	0.648

	Parameter	Magnesium (Mg)-Total	Manganese (Mn)-Total	Mercury (Hg)-Total	Molybdenum (Mo)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	2.0	0.050	0.0050	0.020
Trapline 3	Min	1050.0	27.800	0.1000	0.387
	Max	1490.0	143.000	0.1660	0.619
	Range	1050 - 1490	27.8 - 143	0.1 - 0.166	0.387 - 0.619
	Mean	1266.7	68.175	0.1276	0.514
	95UCLM	1339.0	88.263	0.1406	0.555

	Parameter	Nickel (Ni)-Total	Phosphorus (P)-Total	Potassium (K)-Total	Rubidium (Rb)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	0.20	10	20	0.050
Trapline 1	Min	0.35	20200	9610	16.900
	Max	1.36	30000	12100	51.300
	Range	0.35 - 1.36	20200 - 30000	9610 - 12100	16.9 - 51.3
	Mean	0.70	24657	10867	36.914
	95UCLM	0.94	27107	11564	46.624
Trapline 2	Min	0.51	19500	9840	58.900
	Max	0.91	30900	12400	142.000
	Range	0.51 - 0.91	19500 - 30900	9840 - 12400	58.9 - 142
	Mean	0.65	24800	11203	102.958
	95UCLM	0.72	26954	11722	116.564
Trapline 3	Min	0.36	13500	8920	74.900
	Max	0.94	31900	12400	133.000
	Range	0.36 - 0.94	13500 - 31900	8920 - 12400	74.9 - 133
	Mean	0.58	20442	10633	101.008
	95UCLM	0.66	23328	11224	111.846

	Parameter	Selenium (Se)-Total	Sodium (Na)-Total	Strontium (Sr)-Total	Tellurium (Te)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	0.050	20	0.050	0.020
Trapline 1	Min	1.110	4120	15.300	<0.020
	Max	2.640	5060	22.800	<0.020
	Range	1.11 - 2.64	4120 - 5060	15.3 - 22.8	-
	Mean	1.783	4633	18.657	-
	95UCLM	2.166	4864	20.951	-
Trapline 2	Min	0.641	4190	10.300	<0.020
	Max	1.060	6400	21.300	<0.020
	Range	0.641 - 1.06	4190 - 6400	10.3 - 21.3	-
	Mean	0.806	5095	14.992	-
	95UCLM	0.875	5465	16.990	-
Trapline 3	Min	0.691	3990	8.890	<0.020
	Max	1.440	4950	16.700	<0.020
	Range	0.691 - 1.44	3990 - 4950	8.89 - 16.7	-
	Mean	0.913	4538	12.303	-
	95UCLM	1.038	4714	13.774	-

	Parameter	Thallium (Tl)-Total	Tin (Sn)-Total	Uranium (U)-Total	Vanadium (V)-Total
	Units	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Limit	0.0020	0.10	0.0020	0.10
Trapline 1	Min	<0.0020	0.15	<0.0020	<0.10
	Max	0.0113	0.29	0.0119	0.87
	Range	<0.0020 - 0.0113	0.15 - 0.29	<0.0020 - 0.0119	<0.10 - 0.87
	Mean	0.0050	0.21	0.0032	0.19
	95UCLM	0.0074	0.25	0.0061	0.41
Trapline 2	Min	0.0035	<0.10	<0.0020	<0.10
	Max	0.0100	0.48	0.0189	0.25
	Range	0.0035 - 0.01	<0.10 - 0.48	<0.0020 - 0.0189	<0.10 - 0.25
	Mean	0.0059	0.27	0.0059	0.11
	95UCLM	0.0070	0.34	0.0093	0.15
Trapline 3	Min	0.0049	0.15	<0.0020	<0.10
	Max	0.0119	0.44	0.0264	0.49
	Range	0.0049 - 0.0119	0.15 - 0.44	<0.0020 - 0.0264	<0.10 - 0.49
	Mean	0.0079	0.25	0.0066	0.17
	95UCLM	0.0094	0.29	0.0110	0.27

	Parameter	Zinc (Zn)-Total	Zirconium (Zr)-Total
	Units	mg/kg	mg/kg
	Detection Limit	0.50	0.20
Trapline 1	Min	87.20	<0.20
	Max	108.00	<0.20
	Range	87.2 - 108	-
	Mean	95.51	-
	95UCLM	100.66	-
Trapline 2	Min	91.10	<0.20
	Max	127.00	<0.20
	Range	91.1 - 127	-
	Mean	103.73	-
	95UCLM	109.95	-
Trapline 3	Min	77.60	<0.20
	Max	126.00	<0.20
	Range	77.6 - 126	-
	Mean	100.53	-
	95UCLM	109.38	-

For statistical purposes all data fields that were below detection limit were calculated at half the detection limit when calculating Mean and 95UCLM.

ENVIRONMENTAL DYNAMICS INC.
ATTN: Anne Macleod
2195 - 2nd Avenue
Whitehorse YT Y1A 3T8

Date Received: 23-SEP-15
Report Date: 02-NOV-15 10:53 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1678524

Project P.O. #: NOT SUBMITTED
Job Reference: 14-4-0306:004
C of C Numbers: 1
Legal Site Desc:

[Signature redacted]

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678524-1	L1678524-2	L1678524-3	L1678524-4	L1678524-5
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	27-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15
	Sampled Time					
	Client ID	2-1-B-4	2-2-A-5	2-2-B-6	2-3-B-7	2-4-B-8
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	77.2	74.0	72.0	72.4	77.1
Metals	Aluminum (Al)-Total (mg/kg)	43.4	15.6	54.7	14.4	30.2
	Antimony (Sb)-Total (mg/kg)	0.074	0.288	0.069	0.198	0.132
	Arsenic (As)-Total (mg/kg)	0.239	0.166	0.145	0.100	0.291
	Barium (Ba)-Total (mg/kg)	78.9	41.2	28.7	27.5	36.9
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.015	<0.010	<0.010	<0.010	0.029
	Boron (B)-Total (mg/kg)	1.3	1.0	2.9	2.3	1.8
	Cadmium (Cd)-Total (mg/kg)	0.944	0.536	0.389	0.368	1.32
	Calcium (Ca)-Total (mg/kg)	32300	37300	33000	27900	20300
	Cesium (Cs)-Total (mg/kg)	3.23	1.75	1.63	1.62	3.04
	Chromium (Cr)-Total (mg/kg)	0.426	0.500	0.320	0.193	0.388
	Cobalt (Co)-Total (mg/kg)	0.234	0.181	0.163	0.160	0.301
	Copper (Cu)-Total (mg/kg)	12.4	9.44	8.55	9.21	11.4
	Iron (Fe)-Total (mg/kg)	414	258	271	232	313
	Lead (Pb)-Total (mg/kg)	0.101	0.046	0.075	0.041	0.103
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1680	1490	1570	1430	1430
	Manganese (Mn)-Total (mg/kg)	53.2	27.3	24.6	39.8	65.2
	Mercury (Hg)-Total (mg/kg)	0.196	0.148	0.0675	0.115	0.217
	Molybdenum (Mo)-Total (mg/kg)	0.737	0.539	0.639	0.596	0.624
	Nickel (Ni)-Total (mg/kg)	0.64	0.71	0.56	0.91	0.57
	Phosphorus (P)-Total (mg/kg)	26500	27000	24300	21800	19500
	Potassium (K)-Total (mg/kg)	11900	10200	10300	10000	11900
	Rubidium (Rb)-Total (mg/kg)	142	99.9	107	104	93.4
	Selenium (Se)-Total (mg/kg)	1.06	0.641	0.709	0.670	0.820
	Sodium (Na)-Total (mg/kg)	5860	4240	4950	4720	5240
	Strontium (Sr)-Total (mg/kg)	19.8	17.3	12.0	13.4	10.3
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0051	0.0059	0.0062	0.0056	0.0100
	Tin (Sn)-Total (mg/kg)	0.48	0.29	0.25	0.16	0.36
	Uranium (U)-Total (mg/kg)	0.0038	<0.0020	0.0054	<0.0020	0.0051
	Vanadium (V)-Total (mg/kg)	0.14	0.18	0.13	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	127	94.2	91.1	98.1	108
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678524-6	L1678524-7	L1678524-8	L1678524-9	L1678524-10
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	27-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15
	Sampled Time					
	Client ID	2-6-A-11	2-9-A-14	2-11-A-16	2-11-B-17	2-15-B-23
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	76.4	78.8	74.5	74.2	74.6
Metals	Aluminum (Al)-Total (mg/kg)	59.0	11.7	19.0	61.7	98.5
	Antimony (Sb)-Total (mg/kg)	0.188	0.060	0.091	0.130	0.092
	Arsenic (As)-Total (mg/kg)	0.394	0.119	0.141	0.241	1.09
	Barium (Ba)-Total (mg/kg)	58.6	80.9	32.1	37.2	118
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Boron (B)-Total (mg/kg)	<1.0	2.0	2.5	<1.0	1.7
	Cadmium (Cd)-Total (mg/kg)	1.46	0.810	0.450	0.263	0.520
	Calcium (Ca)-Total (mg/kg)	24200	44500	27400	43700	39900
	Cesium (Cs)-Total (mg/kg)	5.14	1.85	1.75	1.95	1.47
	Chromium (Cr)-Total (mg/kg)	0.400	0.251	0.330	0.205	0.291
	Cobalt (Co)-Total (mg/kg)	0.408	0.210	0.213	0.231	0.275
	Copper (Cu)-Total (mg/kg)	11.1	11.2	9.12	10.8	8.82
	Iron (Fe)-Total (mg/kg)	369	271	270	323	390
	Lead (Pb)-Total (mg/kg)	0.105	0.063	0.046	0.073	0.140
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1490	1690	1390	1460	1650
	Manganese (Mn)-Total (mg/kg)	89.7	87.6	99.4	29.2	43.7
	Mercury (Hg)-Total (mg/kg)	0.191	0.109	0.156	0.169	0.283
	Molybdenum (Mo)-Total (mg/kg)	0.704	0.628	0.690	0.575	0.452
	Nickel (Ni)-Total (mg/kg)	0.76	0.71	0.54	0.75	0.55
	Phosphorus (P)-Total (mg/kg)	21600	30900	22300	30400	28700
	Potassium (K)-Total (mg/kg)	12200	12400	10900	11800	11700
	Rubidium (Rb)-Total (mg/kg)	125	98.5	98.3	138	71.2
	Selenium (Se)-Total (mg/kg)	0.848	0.688	0.776	0.952	0.872
	Sodium (Na)-Total (mg/kg)	5440	6400	4940	4880	4650
	Strontium (Sr)-Total (mg/kg)	13.0	21.3	13.2	13.1	18.8
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0044	0.0035	0.0076	0.0062	0.0080
	Tin (Sn)-Total (mg/kg)	0.38	0.22	0.30	0.38	0.24
	Uranium (U)-Total (mg/kg)	0.0144	<0.0020	0.0025	0.0036	0.0189
	Vanadium (V)-Total (mg/kg)	0.14	<0.10	<0.10	0.18	0.25
	Zinc (Zn)-Total (mg/kg)	114	115	96.4	103	109
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1678524-11	L1678524-12			
	Description	Tissue	Tissue			
	Sampled Date	27-AUG-15	27-AUG-15			
	Sampled Time					
	Client ID	2-16-B-25	2-18-A-27			
TISSUE						
Physical Tests	% Moisture (%)	71.7	74.9			
Metals	Aluminum (Al)-Total (mg/kg)	22.4	23.4			
	Antimony (Sb)-Total (mg/kg)	0.054	0.060			
	Arsenic (As)-Total (mg/kg)	0.293	0.231			
	Barium (Ba)-Total (mg/kg)	30.7	63.7			
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010			
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010			
	Boron (B)-Total (mg/kg)	1.6	1.1			
	Cadmium (Cd)-Total (mg/kg)	0.183	1.01			
	Calcium (Ca)-Total (mg/kg)	31700	25000			
	Cesium (Cs)-Total (mg/kg)	0.746	2.36			
	Chromium (Cr)-Total (mg/kg)	0.224	0.437			
	Cobalt (Co)-Total (mg/kg)	0.156	0.246			
	Copper (Cu)-Total (mg/kg)	8.04	8.86			
	Iron (Fe)-Total (mg/kg)	286	280			
	Lead (Pb)-Total (mg/kg)	0.056	0.063			
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50			
	Magnesium (Mg)-Total (mg/kg)	1230	1240			
	Manganese (Mn)-Total (mg/kg)	26.3	41.5			
	Mercury (Hg)-Total (mg/kg)	0.215	0.277			
	Molybdenum (Mo)-Total (mg/kg)	0.481	0.430			
	Nickel (Ni)-Total (mg/kg)	0.51	0.61			
	Phosphorus (P)-Total (mg/kg)	23200	21400			
	Potassium (K)-Total (mg/kg)	9840	11300			
	Rubidium (Rb)-Total (mg/kg)	58.9	99.3			
	Selenium (Se)-Total (mg/kg)	0.792	0.844			
	Sodium (Na)-Total (mg/kg)	4190	5630			
	Strontium (Sr)-Total (mg/kg)	15.8	11.9			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Thallium (Tl)-Total (mg/kg)	0.0038	0.0043			
	Tin (Sn)-Total (mg/kg)	0.15	<0.10			
	Uranium (U)-Total (mg/kg)	0.0041	0.0056			
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10			
	Zinc (Zn)-Total (mg/kg)	93.2	95.8			
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Thallium (Tl)-Total	MB-LOR	L1678524-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1678524-COFC

COC Number: 14 -

Page ____ of ____

Report To	
Company:	EDI
Contact:	Anne Macleod
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8
Phone:	[phone number redacted]

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☐ Yes ☐ No

☐ Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax [email redacted]

Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

R ☑ Regular (Standard TAT if received by 3 pm - business days)

P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT

E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TA

E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☐ Yes ☑ No
Copy of Invoice with Report	☑ Yes ☐ No
Company:	EDI
Contact:	S Jenner

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax [email redacted]

Email 2

Project Information	
ALS Quote #:	Q52629
Job #:	14-4-0306:004
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: | Cost Center:

GL Account: | Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only)

ALS Contact: Sean Sluggett

Sampler: DH + LH

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HG-DRY-CVAFS-N-VA	MET-DRY-CCMS-N-VA	MOISTURE-TISS-VA	PREP-TISS-DIGEST-VA	Number of Containers
	2-1-B-4	27-Aug-15		Tissue	R	R	R	R	1
	2-2-A-5	27-Aug-15		Tissue					1
	2-2-B-6	27-Aug-15		Tissue					1
	2-3-B-7	27-Aug-15		Tissue					1
	2-4-B-8	27-Aug-15		Tissue					1
	2-6-A-11	27-Aug-15		Tissue					1
	2-9-A-14	27-Aug-15		Tissue					1
	2-11-A-16	27-Aug-15		Tissue					1
	2-11-B-17	27-Aug-15		Tissue					1
	2-15-B-23	27-Aug-15		Tissue					1
	2-16-B-25	27-Aug-15		Tissue					1
	2-18-A-27	27-Aug-15		Tissue					1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 20

FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
[signature redacted]	Date: 23 Sept. 2015	Time: 10:54	Received [signature redacted]	Date: 23 Sept 15	Time: 1:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

[signature redacted]

ENVIRONMENTAL DYNAMICS INC.
ATTN: Anne Macleod
2195 - 2nd Avenue
Whitehorse YT Y1A 3T8

Date Received: 23-SEP-15
Report Date: 30-OCT-15 12:34 (MT)
Version: FINAL

Client Phone: [phone number redacted]

Certificate of Analysis

Lab Work Order #: L1678534

Project P.O. #: NOT SUBMITTED
Job Reference: 14-4-0306:004
C of C Numbers: 1
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678534-1	L1678534-2	L1678534-3	L1678534-4	L1678534-5
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	28-AUG-15	29-AUG-15	29-AUG-15	29-AUG-15	30-AUG-15
	Sampled Time					
	Client ID	1-4-B-40	1-1-B-45	1-2-B-46	1-5-A-47	1-2-A-56
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	71.7	72.8	69.8	69.8	71.8
Metals	Aluminum (Al)-Total (mg/kg)	35.4	222	30.8	31.4	26.7
	Antimony (Sb)-Total (mg/kg)	0.082	0.843	0.292	0.387	0.290
	Arsenic (As)-Total (mg/kg)	0.253	0.227	0.042	0.095	0.086
	Barium (Ba)-Total (mg/kg)	25.8	29.4	18.3	16.9	19.3
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	0.024	<0.010	<0.010
	Boron (B)-Total (mg/kg)	2.1	1.8	2.4	1.8	2.5
	Cadmium (Cd)-Total (mg/kg)	0.264	0.476	0.223	0.311	0.275
	Calcium (Ca)-Total (mg/kg)	42500	31200	30800	34700	37400
	Cesium (Cs)-Total (mg/kg)	0.729	0.731	0.158	0.199	0.348
	Chromium (Cr)-Total (mg/kg)	0.211	0.828	0.257	0.064	0.300
	Cobalt (Co)-Total (mg/kg)	0.175	0.278	0.064	0.064	0.081
	Copper (Cu)-Total (mg/kg)	9.75	9.24	7.76	7.47	9.37
	Iron (Fe)-Total (mg/kg)	331	542	252	233	266
	Lead (Pb)-Total (mg/kg)	0.069	0.172	0.067	0.042	0.057
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1780	1670	1390	1350	1670
	Manganese (Mn)-Total (mg/kg)	12.0	12.3	9.24	9.51	10.8
	Mercury (Hg)-Total (mg/kg)	0.0742	0.0431	0.0265	0.0372	0.0367
	Molybdenum (Mo)-Total (mg/kg)	0.797	0.813	0.636	0.693	0.680
	Nickel (Ni)-Total (mg/kg)	0.67	1.36	0.42	0.35	0.54
	Phosphorus (P)-Total (mg/kg)	30000	23000	21900	24800	27100
	Potassium (K)-Total (mg/kg)	11600	11300	9610	9660	11000
	Rubidium (Rb)-Total (mg/kg)	51.3	43.9	16.9	25.5	40.7
	Selenium (Se)-Total (mg/kg)	2.64	1.87	1.30	2.17	1.77
	Sodium (Na)-Total (mg/kg)	4930	4660	4530	4690	5060
	Strontium (Sr)-Total (mg/kg)	22.7	18.8	15.3	18.5	17.0
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0113	0.0058	0.0032	<0.0020	0.0033
	Tin (Sn)-Total (mg/kg)	0.19	0.15	0.26	0.15	0.29
	Uranium (U)-Total (mg/kg)	0.0029	0.0119	0.0021	<0.0020	<0.0020
	Vanadium (V)-Total (mg/kg)	0.13	0.87	0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	108	93.3	89.2	87.2	94.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678534-6	L1678534-7				
	Description	Tissue	Tissue				
	Sampled Date	30-AUG-15	30-AUG-15				
	Sampled Time						
	Client ID	1-14-A-58	1-17-A-59				
Grouping	**Analyte**						
TISSUE							
Physical Tests	% Moisture (%)	71.7	70.3				
Metals	Aluminum (Al)-Total (mg/kg)	27.8	13.4				
	Antimony (Sb)-Total (mg/kg)	0.125	0.123				
	Arsenic (As)-Total (mg/kg)	0.113	0.032				
	Barium (Ba)-Total (mg/kg)	23.5	26.5				
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010				
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010				
	Boron (B)-Total (mg/kg)	2.8	2.7				
	Cadmium (Cd)-Total (mg/kg)	0.502	0.295				
	Calcium (Ca)-Total (mg/kg)	33800	24900				
	Cesium (Cs)-Total (mg/kg)	0.346	0.650				
	Chromium (Cr)-Total (mg/kg)	0.114	0.626				
	Cobalt (Co)-Total (mg/kg)	0.150	0.154				
	Copper (Cu)-Total (mg/kg)	9.51	8.87				
	Iron (Fe)-Total (mg/kg)	277	250				
	Lead (Pb)-Total (mg/kg)	0.028	0.037				
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50				
	Magnesium (Mg)-Total (mg/kg)	1570	1440				
	Manganese (Mn)-Total (mg/kg)	14.5	26.9				
	Mercury (Hg)-Total (mg/kg)	0.0645	0.143				
	Molybdenum (Mo)-Total (mg/kg)	0.713	0.850				
	Nickel (Ni)-Total (mg/kg)	0.73	0.80				
	Phosphorus (P)-Total (mg/kg)	25600	20200				
	Potassium (K)-Total (mg/kg)	12100	10800				
	Rubidium (Rb)-Total (mg/kg)	29.8	50.3				
	Selenium (Se)-Total (mg/kg)	1.62	1.11				
	Sodium (Na)-Total (mg/kg)	4440	4120				
	Strontium (Sr)-Total (mg/kg)	15.5	22.8				
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020				
	Thallium (Tl)-Total (mg/kg)	0.0045	0.0058				
	Tin (Sn)-Total (mg/kg)	0.20	0.24				
	Uranium (U)-Total (mg/kg)	0.0023	<0.0020				
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10				
	Zinc (Zn)-Total (mg/kg)	99.9	96.2				
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1678534-COFC

COC Number: 14 -

Page ____ of ____

Report To

Company:	EDI
Contact:	Anne Macleod
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8
Phone:	[phone number redacted]

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☐ Yes ☐ No
☐ Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax [email redacted]
Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm T/
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Specify Date Required for E2,E or P:

Invoice To

Same as Report To ☐ Yes ☑ No
Copy of Invoice with Report ☑ Yes ☐ No
Company: EDI
Contact: S Jenner

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax [email redacted]
Email 2

Project Information

ALS Quote #: Q52629
Job #: 14-Y-0306:004
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:
GL Account: Routing Code:
Activity Code:
Location:

ALS Lab Work Order # (lab use only)

ALS Contact: Sean Sluggett
Sampler: DH + LH

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HG-DRY-CVAFS-N-VA	MET-DRY-CCMS-N-VA	MOISTURE-TISS-VA	PREP-TISS-DIGEST-VA	Number of Containers
	1-4-B-40	28-Aug-15	—	Tissue	R	R	R	R	1
	1-1-B-45	29-Aug-15	—	Tissue	↓	↓	↓	↓	1
	1-2-B-46	29-Aug-15	—	Tissue	↓	↓	↓	↓	1
	1-5-A-47	29-Aug-15	—	Tissue	↓	↓	↓	↓	1
	1-2-A-56	30-Aug-15	—	Tissue	↓	↓	↓	↓	1
	1-14-A-58	30-Aug-15	—	Tissue	↓	↓	↓	↓	1
	1-17-A-59	30-Aug-15	—	Tissue	↓	↓	↓	↓	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No
Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C

SHIPMENT RELEASE (client use)

Released by: [signature redacted] Date: 23 Sept. 2015 Time: 11:27

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: [signature] Date: 23 Sept 15 Time: 11:30

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

[signature redacted]

ENVIRONMENTAL DYNAMICS INC.
ATTN: Anne Macleod
2195 - 2nd Avenue
Whitehorse YT Y1A 3T8

Date Received: 23-SEP-15
Report Date: 30-OCT-15 12:38 (MT)
Version: FINAL

Client Phone: [Signature redacted]

Certificate of Analysis

Lab Work Order #: L1678541
Project P.O. #: NOT SUBMITTED
Job Reference: 14-4-0306:004
C of C Numbers: 1
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678541-1	L1678541-2	L1678541-3	L1678541-4	L1678541-5
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15
	Sampled Time					
	Client ID	3-5-B-32	3-6-B-33	3-9-B-35	3-14-A-37	3-18-A-38
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	72.7	74.9	72.5	73.7	75.6
Metals	Aluminum (Al)-Total (mg/kg)	15.3	4.4	7.6	10.0	11.7
	Antimony (Sb)-Total (mg/kg)	0.055	0.044	0.069	0.036	0.059
	Arsenic (As)-Total (mg/kg)	0.053	0.056	0.056	0.034	0.024
	Barium (Ba)-Total (mg/kg)	67.7	90.6	137	43.5	65.4
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	0.010	<0.010	<0.010	0.032	<0.010
	Boron (B)-Total (mg/kg)	3.6	2.9	2.5	<1.0	<1.0
	Cadmium (Cd)-Total (mg/kg)	0.977	1.26	1.45	0.878	1.65
	Calcium (Ca)-Total (mg/kg)	12500	15000	19100	31000	44100
	Cesium (Cs)-Total (mg/kg)	2.30	3.28	2.44	2.16	3.21
	Chromium (Cr)-Total (mg/kg)	0.224	0.359	0.103	0.120	0.133
	Cobalt (Co)-Total (mg/kg)	0.266	0.226	0.240	0.230	0.318
	Copper (Cu)-Total (mg/kg)	7.89	7.48	8.14	8.29	12.3
	Iron (Fe)-Total (mg/kg)	202	235	211	238	312
	Lead (Pb)-Total (mg/kg)	0.059	0.041	0.063	0.040	0.045
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1170	1110	1290	1340	1490
	Manganese (Mn)-Total (mg/kg)	56.3	56.4	79.6	62.6	50.1
	Mercury (Hg)-Total (mg/kg)	0.102	0.114	0.136	0.128	0.143
	Molybdenum (Mo)-Total (mg/kg)	0.474	0.387	0.438	0.562	0.513
	Nickel (Ni)-Total (mg/kg)	0.50	0.53	0.52	0.43	0.46
	Phosphorus (P)-Total (mg/kg)	13500	14800	17100	24300	31900
	Potassium (K)-Total (mg/kg)	9780	9760	9680	10900	12400
	Rubidium (Rb)-Total (mg/kg)	87.5	94.8	95.6	107	133
	Selenium (Se)-Total (mg/kg)	1.18	0.963	1.05	0.761	0.737
	Sodium (Na)-Total (mg/kg)	4610	4950	4580	4330	4760
	Strontium (Sr)-Total (mg/kg)	8.89	9.67	12.5	13.9	14.8
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0049	0.0056	0.0049	0.0119	0.0094
	Tin (Sn)-Total (mg/kg)	0.16	0.15	0.21	0.25	0.21
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0022	<0.0020
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	77.7	91.8	96.1	99.5	118
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678541-6	L1678541-7	L1678541-8	L1678541-9	L1678541-10
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	29-AUG-15	29-AUG-15	30-AUG-15	31-AUG-15	31-AUG-15
	Sampled Time					
	Client ID	3-1-B-42	3-6-A-43	3-15-B-54	3-1-B-61	3-4-A-63
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.0	73.9	74.0	67.5	74.3
Metals	Aluminum (Al)-Total (mg/kg)	82.2	91.4	39.7	134	101
	Antimony (Sb)-Total (mg/kg)	0.708	0.410	0.522	0.030	0.027
	Arsenic (As)-Total (mg/kg)	0.136	0.318	0.088	0.263	0.165
	Barium (Ba)-Total (mg/kg)	37.9	45.1	77.6	47.7	61.9
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Boron (B)-Total (mg/kg)	<1.0	<1.0	1.4	<1.0	<1.0
	Cadmium (Cd)-Total (mg/kg)	0.471	0.611	2.78	0.249	0.439
	Calcium (Ca)-Total (mg/kg)	17800	28300	24100	21900	34800
	Cesium (Cs)-Total (mg/kg)	3.59	2.47	2.79	0.902	0.694
	Chromium (Cr)-Total (mg/kg)	1.89	0.315	0.219	0.472	0.482
	Cobalt (Co)-Total (mg/kg)	0.200	0.120	0.435	0.169	0.178
	Copper (Cu)-Total (mg/kg)	9.82	9.00	12.9	7.55	9.83
	Iron (Fe)-Total (mg/kg)	384	312	312	392	445
	Lead (Pb)-Total (mg/kg)	0.082	0.088	0.103	0.181	0.154
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Magnesium (Mg)-Total (mg/kg)	1190	1330	1420	1050	1350
	Manganese (Mn)-Total (mg/kg)	27.8	61.6	136	47.8	52.5
	Mercury (Hg)-Total (mg/kg)	0.140	0.166	0.166	0.100	0.109
	Molybdenum (Mo)-Total (mg/kg)	0.549	0.551	0.619	0.412	0.545
	Nickel (Ni)-Total (mg/kg)	0.94	0.36	0.71	0.65	0.65
	Phosphorus (P)-Total (mg/kg)	17600	21900	21200	17600	25600
	Potassium (K)-Total (mg/kg)	11100	10900	11900	8920	11400
	Rubidium (Rb)-Total (mg/kg)	129	123	108	74.9	78.9
	Selenium (Se)-Total (mg/kg)	0.691	0.899	0.772	0.859	1.44
	Sodium (Na)-Total (mg/kg)	4520	4310	4770	4030	4840
	Strontium (Sr)-Total (mg/kg)	10.1	14.6	14.9	9.88	16.7
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)	0.0105	0.0108	0.0070	0.0096	0.0053
	Tin (Sn)-Total (mg/kg)	0.26	0.23	0.22	0.20	0.35
	Uranium (U)-Total (mg/kg)	0.0105	0.0155	0.0034	0.0264	0.0089
	Vanadium (V)-Total (mg/kg)	0.36	0.32	0.11	0.45	0.49
	Zinc (Zn)-Total (mg/kg)	88.0	97.7	126	77.6	106
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1678541-11	L1678541-12			
	Description	Tissue	Tissue			
	Sampled Date	31-AUG-15	31-AUG-15			
	Sampled Time					
	Client ID	3-5-A-64	3-14-A-70			
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	69.9	73.1			
Metals	Aluminum (Al)-Total (mg/kg)	28.7	27.7			
	Antimony (Sb)-Total (mg/kg)	0.013	<0.010			
	Arsenic (As)-Total (mg/kg)	0.092	0.050			
	Barium (Ba)-Total (mg/kg)	32.3	65.9			
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010			
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010			
	Boron (B)-Total (mg/kg)	1.6	1.2			
	Cadmium (Cd)-Total (mg/kg)	0.313	0.596			
	Calcium (Ca)-Total (mg/kg)	23400	24600			
	Cesium (Cs)-Total (mg/kg)	0.930	0.798			
	Chromium (Cr)-Total (mg/kg)	0.168	0.263			
	Cobalt (Co)-Total (mg/kg)	0.107	0.203			
	Copper (Cu)-Total (mg/kg)	8.31	9.74			
	Iron (Fe)-Total (mg/kg)	233	293			
	Lead (Pb)-Total (mg/kg)	0.052	0.068			
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50			
	Magnesium (Mg)-Total (mg/kg)	1220	1240			
	Manganese (Mn)-Total (mg/kg)	44.4	143			
	Mercury (Hg)-Total (mg/kg)	0.109	0.118			
	Molybdenum (Mo)-Total (mg/kg)	0.523	0.597			
	Nickel (Ni)-Total (mg/kg)	0.64	0.51			
	Phosphorus (P)-Total (mg/kg)	18700	21100			
	Potassium (K)-Total (mg/kg)	9760	11100			
	Rubidium (Rb)-Total (mg/kg)	88.4	92.0			
	Selenium (Se)-Total (mg/kg)	0.899	0.699			
	Sodium (Na)-Total (mg/kg)	3990	4760			
	Strontium (Sr)-Total (mg/kg)	10.3	11.4			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Thallium (Tl)-Total (mg/kg)	0.0098	0.0052			
	Tin (Sn)-Total (mg/kg)	0.28	0.44			
	Uranium (U)-Total (mg/kg)	0.0046	0.0037			
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10			
	Zinc (Zn)-Total (mg/kg)	110	118			
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Barium (Ba)-Total	DUP-H	L1678541-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1678541-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Phosphorus (P)-Total	DUP-H	L1678541-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1678541-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code **Laboratory Location**

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1678541-COFC

COC Number: 14 -

Page ___ of ___

Report To	
Company:	EDI
Contact:	Anne Macleod
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8
Phone:	[phone number redacted]

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☐ Yes ☐ No
☐ Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax [email redacted]
Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Specify Date Required for E2,E or P:

Invoice To	
Same as Report To	☐ Yes ☑ No
Copy of Invoice with Report	☑ Yes ☐ No
Company:	EDI
Contact:	S Jenner

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax [email redacted]
Email 2

Project Information

ALS Quote #:	Q52629
Job #:	14-Y-0306:004
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:
GL Account: Routing Code:
Activity Code:
Location:

ALS Lab Work Order # (lab use only)

ALS Contact: Sean Sluggett
Sampler: DH + LH

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HG-DRY-CVAFS-N-VA	MET-DRY-CCMS-N-VA	MOISTURE-TISS-VA	PREP-TISS-DIGEST-VA	Number of Containers
	3-5-B-32	28-Aug-15		Tissue	R	R	R	R	1
	3-6-B-33	28-Aug-15		Tissue					1
	3-9-B-35	28-Aug-15		Tissue					1
	3-14-A-37	28-Aug-15		Tissue					1
	3-18-A-38	28-Aug-15		Tissue					1
	3-1-B-42	29-Aug-15		Tissue					1
	3-6-A-43	29-Aug-15		Tissue					1
	3-15-B-54	30-Aug-15		Tissue					1
	3-1-B-61	31-Aug-15		Tissue					1
	3-4-A-63	31-Aug-15		Tissue					1
	3-5-A-64	31-Aug-15		Tissue					1
	3-14-A-70	31-Aug-15		Tissue					1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No
Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C

SHIPMENT RELEASE (client use)

Released by: [Signature redacted] Date: 23 Sept, 15 Time: 10:30

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

[signature redacted]