



Wolverine Project

WILDLIFE PROTECTION PLAN

VERSION 2009-01

Prepared by:

Yukon Zinc Corporation
Vancouver, British Columbia

In partnership with:

Ross River Dena Council, Ross River, YT
Liard First Nation, Watson Lake, YT
Yukon Environment, Whitehorse/Watson Lake, YT

April 9, 2009

Table of Contents

1. INTRODUCTION.....	1
1.1 THE WOLVERINE PROJECT.....	1
1.2 YZC ENVIRONMENTAL POLICIES	5
2. ENVIRONMENTAL PROTECTION PLANS.....	5
2.1 WILDLIFE PROTECTION PLAN	5
3. WILDLIFE RESOURCES	6
3.1 VALUED ECOLOGICAL AND CULTURAL COMPONENTS.....	7
3.2 OVERVIEW OF SEASONAL USE AND HABITAT FOR SELECTED WILDLIFE	8
4. WILDLIFE PROTECTION PROCEDURES	10
4.1 GENERAL: WILDLIFE-HUMAN CONFLICTS	10
4.2 LAND USE	12
4.3 TRANSPORTATION: ROADS AND AIRCRAFT	12
4.4 WILDLIFE HABITAT PROTECTION.....	13
4.5 TAILINGS FACILITY OPERATION AND MANAGEMENT	14
5. MONITORING.....	14
5.1 WILDLIFE RECORDS PROGRAM	14
5.2 TAILINGS FACILITY MONITORING.....	15
5.3 WINTER WILDLIFE MONITORING	15
5.4 MONITORING OF METAL LEVELS IN VEGETATION	15
5.5 MONITORING OF METAL LEVELS IN SMALL MAMMALS.....	15
5.6 REGIONAL WILDLIFE MONITORING PROGRAMS.....	16
6. MONITORING PROGRAM MANAGEMENT AND REPORTING	16
7. REFERENCES.....	18

Figures

Figure 1 Yukon Zinc Corporation's Wolverine Project Location.....	1
Figure 2: Wolverine Project Site Plan.....	3

Tables

Table 1: Issues and Concerns for Wildlife Identified through Consultation with the Kaska Nation.....	4
Table 2: WPP Conformance with QML-0006 Section 12.3 Requirements	6
Table 3: Selected Wildlife VECCs based on 2005/2006 EA Consultation and QML-0006 Requirements	7
Table 4: Wildlife Occurrence and Habitat Availability for Key Seasonal Periods in the Wolverine Project Area (YZC, 2005a).....	8
Table 5: Wolverine Project Wildlife Monitoring Program Summary	16

Appendices

Appendix A YZC Environmental Policies.....	19
Appendix B Guidelines for Minimizing Disturbance to Wildlife and the Habitats from Monitoring Activities.....	24
Appendix C Wildlife Records Program: Procedures for Reporting Wildlife Incidents and Observations.....	27
Appendix D Tailings Facility Monitoring Protocol.....	35
Appendix E: Winter Wildlife Monitoring Protocol	45
Appendix F Metal Levels in Vegetation Protocol	57
Appendix G Metal Levels in Small Mammals Protocol	68
Appendix H Wildlife Protection Plan Contact Information.....	79

1. INTRODUCTION

1.1 The Wolverine Project

Yukon Zinc Corporation's (YZC) Wolverine Project (the Project) is a zinc-silver-copper-lead-gold underground mining project located in the Finlayson District of the southeast Yukon approximately 590 km northeast of Whitehorse, 180 km southeast of Ross River, and 190 km northwest of Watson Lake via the Robert Campbell Highway (Figure 1). Access to the Project is by fixed-wing aircraft, helicopter, or an all season gravel access road that connects with the Robert Campbell Highway at km 190.

The Project is situated near the headwaters of the Wolverine Lake (or *Nougha Mene*) watershed, and is within the traditional territory of the Kaska Nation. The Kaska Nation in the Yukon is comprised of the Ross River Dena Council (RRDC) and the Liard First Nation (LFN). *Nougha Mene*, an important area to the Kaska, is a place for rejuvenation of the spirit, for renewing connections with the land, for practicing cultural traditions, and is also utilized for its wildlife, fish and plant resources.

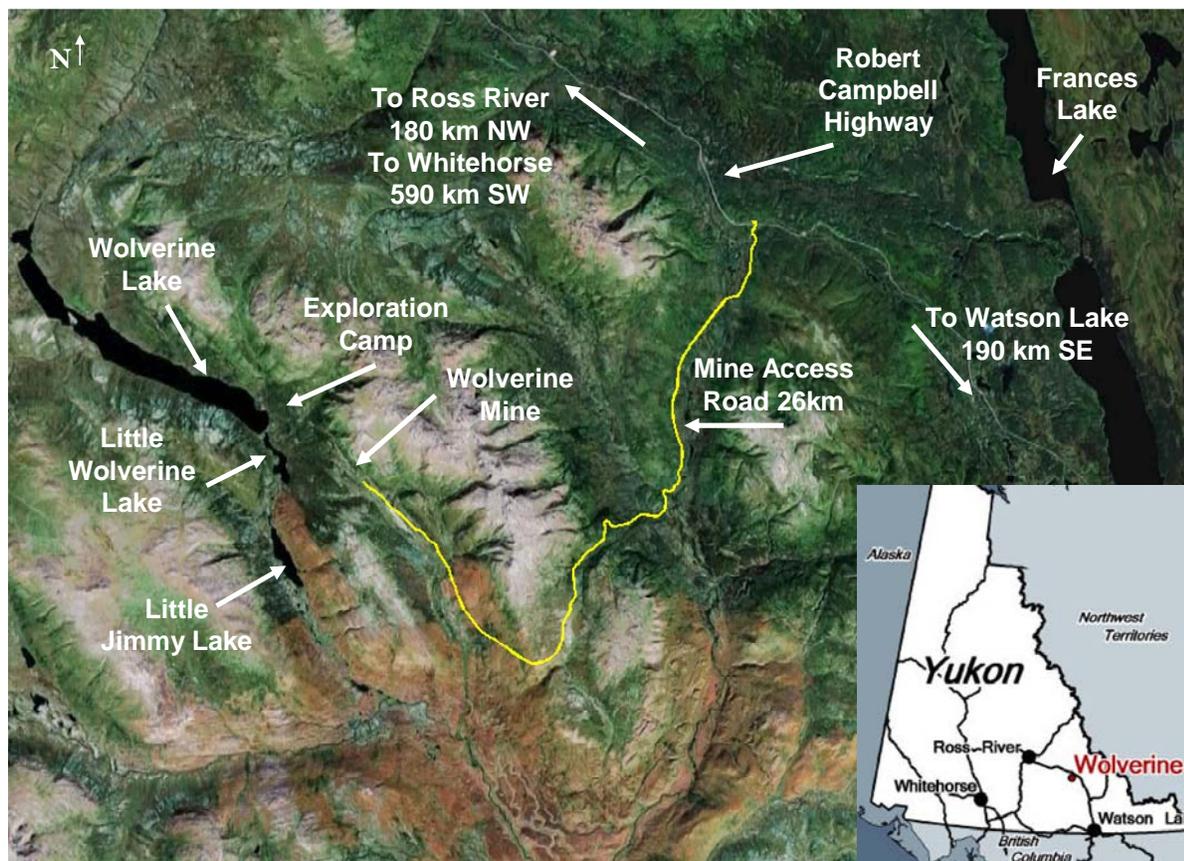


Figure 1 Yukon Zinc Corporation's Wolverine Project Location

The Project will mine approximately 1,700 t/d of diluted ore. Following an 18-month construction phase, the mine is expected to be in operation for a period of about 9 years. For a detailed description of all project components, and schedule of activities, refer to the *General Site Plan 2008-04*. Reclamation and closure activities will occur over a three-year period as described in the *Wolverine Project Reclamation and Closure Plan 2008-02*.

As shown on Figures 1 and 2, the infrastructure associated with the Project includes:

- 27 km gravel all season access road;
- airstrip;
- camp complex (i.e., bunk houses, kitchen/eating area, recreation area);
- underground mine;
- industrial complex (i.e., truck shop, crushers, process plant, laboratory, office buildings);
- fuel storage area;
- water management and treatment infrastructure;
- explosives storage area;
- diesel generators with power distribution;
- incinerator and landfill with electrified exclusion fencing;
- land treatment facility;
- tailings facility;
- site roads;
- waste rock pad;
- borrow areas;
- freshwater (potable) wells with pumps and pipe for distribution;
- potable water treatment plant; and,
- sewage treatment plant.

The average elevation of the Project area is 1,350 m above sea level (a.s.l.) with a typically cold climate. Mean daily temperatures in summer average about 15°C, and -25°C in winter. Rain is common from May through September with mean annual rainfall amounts of 570 mm. Snow is typical between October and April, and annual accumulations are generally less than 200 cm. Wind gusts usually average less than 15 km/h throughout most of the year, and generally do not exceed 40 km/h.

The region near Wolverine Lake is sparsely populated by humans, and supports a number of wildlife species (see Section 3). Land use activities, including hunting, trapping, and recreation, have been popular in the Wolverine Lake area, but are typically limited in the immediate vicinity of the mine site, which is located several kilometres upslope or east of the lake (Figure 1). Teslin Outfitters is the guide outfitter in the region with the majority of outfitting activities occurring to the west of the Project, and RRDC holds the group trapping concession in the vicinity of the Project. Frances Lake, located northeast of the main Project area (Figure 1), is the main local recreational area with the Frances Lake Campground and Wilderness Lodge located on the lake.

In July 2005, YZC entered into a *Socio-Economic Participation Agreement (SEPA)* with the RRDC on behalf of the Kaska Nation. The SEPA outlines the provisions for the participation of the Kaska Nation in exploration, development, and operational activities associated with the Wolverine Project, and exploration in the Finlayson District. YZC subsequently entered into a *Traditional Knowledge Protocol* with RRDC in September 2006 to ensure that traditional knowledge was meaningfully considered, so that sites and areas of significance were not compromised by project activities.

YZC is permitted to proceed with the development and operation of the Wolverine Project. The Environmental Assessment (EA) review phase began in October 2005 with the submission of an EA report. Receipt of the *EA Screening Report* in September 2006 allowed for the permitting phase to proceed. YZC was issued a *Quartz Mining License (QML-0006)* in December 2006 and a *Type A Water Licence (Q204-065)* in October 2007. Through all phases, input from various government agencies, the Kaska Nation, and stakeholders was considered. Table 1 provides a summary of the key wildlife issues and concerns that were raised during the EA and permitting phases by the Kaska Nation.

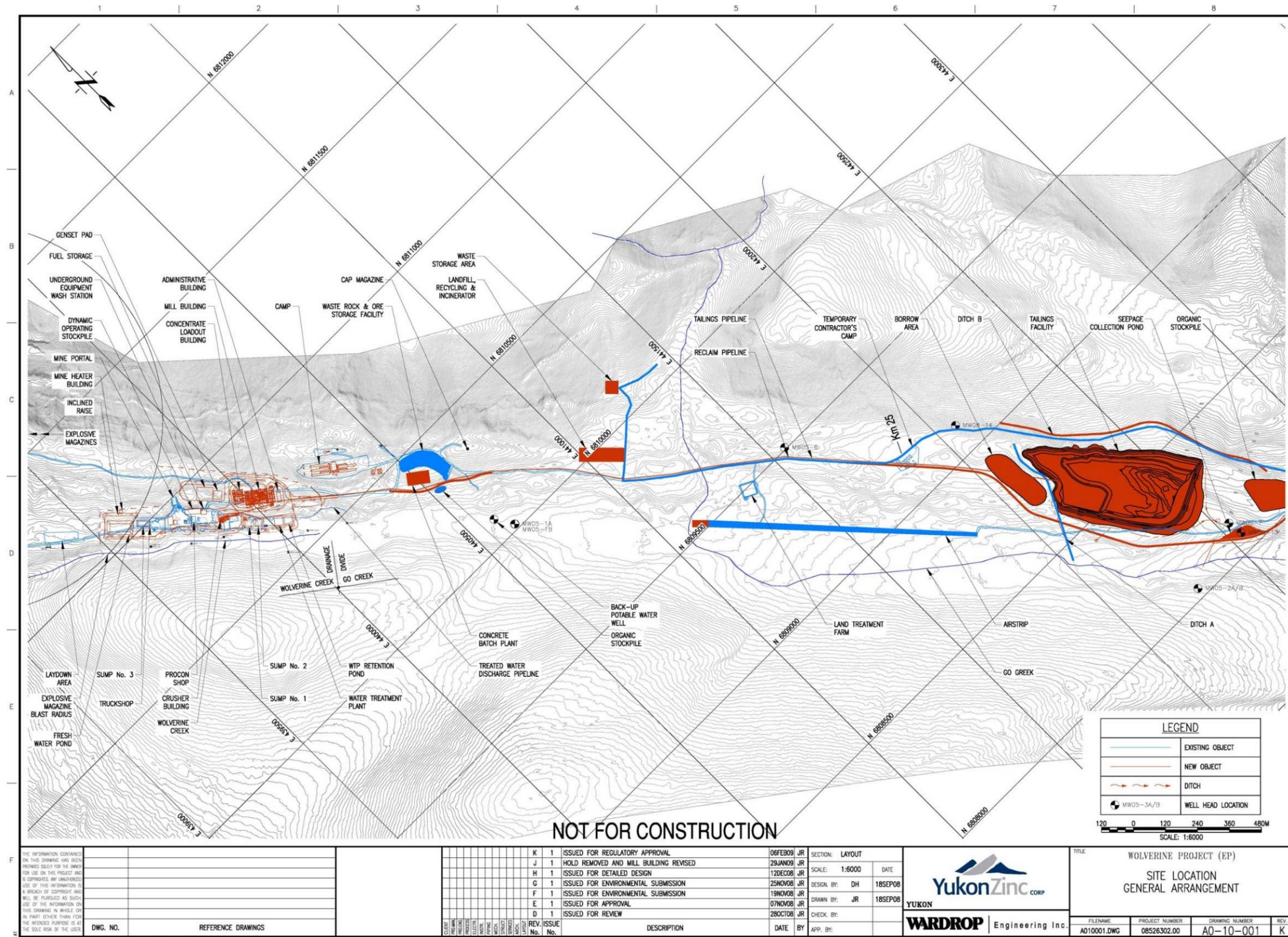


Figure 2: Wolverine Project Site Plan

Table 1: Issues and Concerns for Wildlife Identified through Consultation with the Kaska Nation

Category	Wildlife Issues and Concerns Identified by the Kaska
General	<ul style="list-style-type: none"> • Signs and prohibitions for no littering and feeding wildlife • Response strategy for bears (e.g., reporting, deterrents) • Delivery of bear awareness workshop • Management of wastes (e.g., disposal, bear proof containers, electric fencing) • Prohibitions on firearms, hunting or fishing by employees • Restricted road use (i.e., locked gates) • Prohibition of non-employees at site and on road • Reporting of all licensed hunting and fishing activities • Reporting of incidents to an Environmental Monitor
Attractants	<ul style="list-style-type: none"> • Restrictions on use of salt • Re-vegetation using unpalatable species
Roads	<ul style="list-style-type: none"> • Road use guidelines (e.g., minimize traffic volume, avoid sensitive periods, warnings, speed restrictions, gate and security procedures) • Road management guidelines (e.g., snow push-outs) • Gating and prohibition of traffic on road, ATV restrictions
Wildlife Disturbance	<ul style="list-style-type: none"> • Baseline data on seasonal distribution of selected species; track surveys and observations of wildlife • Revise key habitat maps based on TK and available science if necessary • Continue monitoring caribou through seasonal helicopter surveys (and ground-based surveys)
Contaminants	<ul style="list-style-type: none"> • Temporary fencing • Surveillance of facility (e.g., cameras, employees) • Use of deterrents (e.g., netting, explosive devices, audio devices) • Prevent re-vegetation around tailings pond • Baseline data collection and assay for ptarmigan, voles and certain vegetation
Aircraft	<ul style="list-style-type: none"> • Avoid over flights of key habitats during key periods • Identify key habitats and key periods of use by sheep, caribou and waterfowl • Develop guidelines to minimize disturbance to wildlife • Predetermine outfitter activities and avoid these areas

In conjunction with the Environmental Assessment (EA), YZC retained RRDC Traditional Knowledge (TK) Committee to complete a TK report for the Project area. The confidential report, entitled *Wolverine Mine Project TK Interviews September 2005-December 2005*¹ (TK Report) is not presented within this WPP due to confidentiality requirements agreed to between RRDC and YZC. Nevertheless, general outcomes from the TK Report are summarized below.

- Two figures within the TK Report document areas of cultural significance and known wildlife migration corridors and habitat.
- There are no mineral licks within the footprint of or near project infrastructure such as the mill site and camp, tailings facility or mine access road. There are three mineral licks located within the general area (northeast and northwest of the mine area).
- Wildlife migration routes do not conflict with mine infrastructure or the tailings facility, but moose migration routes have been identified in the vicinity of the mine access road.
- The closest known sheep area is described as being southwest of the mine, and paralleling an unspecified waterway east of the mine.
- Caribou calving grounds are located outside the Project footprint (greater than 30 km away).

¹ *Wolverine Mine Project TK Interviews September 2005-December 2005*¹, prepared by Norman Sterriah (Ross River Dena Council TK Coordinator)

- The only mapped project-TK interaction is at the north end of the mine access road where the road crosses a traditional trail. The road was designed to bisect the trail to minimize the amount of disturbance, and only crosses the trail once. During road construction in 2007, Environmental Technician Billie Maje was onsite during construction activities to observe and mitigate any potential cultural or environmental conflicts. No additional cultural conflicts were observed.

The TK Report information has been incorporated in this document in the form of monitoring of the Wolverine Project area as a whole, and notably within the area where the TK Report shows migratory routes. Based on the monitoring results, speed limits will be reduced and snow plough push-outs will be locations where wildlife frequent.

1.2 YZC Environmental Policies

Protection of the environment is a corporate priority for YZC. The Company is committed to managing its business in a way that will contribute and achieve a high level of environmental performance, and meet the goal of continuous improvement. YZC will strive to preserve and protect the environment for the future while providing a safe and responsible operating environment through the development and implementation of its environmental policies and plans. Policies that have been developed for the Project and are relevant to the *Wildlife Protection Plan (WPP)* include:

- *Environmental Protection Policy*
- *Health and Safety Policy*
- *Heritage Resources Protection Policy*
- *Wolverine Project Firearm Policy*

These policies are provided in Appendix A.

2. ENVIRONMENTAL PROTECTION PLANS

Wolverine Project Environmental Protection Plans (EPPs) required by *QML-0006* include the *Wildlife Protection Plan*, *Waste Management Plan*, *Spill and Contingency Plan*, *Heritage Resources Protection Plan*, and *Monitoring and Surveillance Plan*. Each EPP is a fundamental component of the environmental management and planning process for the mine, and provides a practical way to minimize environmental and socio-economic impacts from work areas, activities, and operations. The EPPs will provide YZC with a reference for monitoring regulatory compliance, and are or will be adaptive in approach, to allow for improvements to management policies and procedures over time.

2.1 Wildlife Protection Plan

This Wildlife Protection Plan (WPP) has been developed by YZC in partnership with RRDC, LFN and Yukon Environment (YE) through the Wolverine Project Wildlife Technical Committee (WTC). The WPP has been developed to satisfy requirements under *QML-0006 Section 12.3*, as outlined in Table 2. The WPP also provides procedures for minimizing and managing impacts to wildlife from routine mine activities, provides a framework for the development and implementation of wildlife monitoring programs, and processes for improving mitigation and management measures through adaptive management. The focus of the WPP is on the protection of wildlife resources, and does not include aquatic resources (e.g., fish, benthic invertebrates), which are addressed through other mechanisms such the *Metal Mining Effluent Regulations* and the Wolverine Project *Monitoring and Surveillance Plan*.

Table 2: WPP Conformance with QML-0006 Section 12.3 Requirements

QML-0006 Section 12.3 Regulatory Requirements	Section Where Requirement Addressed
a) Measures to restrict public access to the site during development, and production, temporary closure, and during decommissioning and post-closure.	Section 4.3 Transportation: Roads and Aircraft
b) A program for wildlife monitoring at and within the immediate vicinity of the site, including monitoring of waterfowl and shorebirds within the tailings management facility during key migration periods.	Section 5 Monitoring Appendix C to G: Monitoring Protocols
c) Identification and posting of appropriate speed limits for the access road and any other road at the site to reduce wildlife casualties and the method of ensuring that such limits are not exceeded by employees or contractors of the Licensee.	Section 4.3 Transportation: Roads and Aircraft
d) Mechanisms to be used to prohibit private on-road and off-road vehicles on the access road and site.	Section 4.3 Transportation: Roads and Aircraft
e) Mechanisms to ensure that employees and contractors of the Licensee do not bring firearms or hunt in association with their employment at site, unless otherwise permitted by the Chief, Energy, Mines and Resources.	Section 4.1 Human-Wildlife Conflicts Appendix A Wolverine Project Firearm Policy
f) A protocol for aircraft use over and in the vicinity of: <ul style="list-style-type: none"> - Wolverine Lake, Little Wolverine Lake, and Little Jimmy Lake; - Known critical wildlife habitat in the area of the Undertaking including caribou rutting and sheep lambing areas; - Areas to be used by local outfitting concession holder. 	Section 4.2 Land Use Section 4.3 Transportation: Roads and Aircraft
g) A protocol for contacting the local outfitting concession holder to identify areas where the concession holder may be conducting outfitting activities that will be occurring during the next upcoming outfitting season.	Section 4.2 Land Use
h) Mechanisms for avoiding disturbance of trap lines and traditional trails by the Undertaking.	Section 4.2 Land Use
i) Strategies and schedule for constructing snow plough "push-outs" to allow for the escape of wildlife on the haul road.	Section 4.3 Transportation: Roads and Aircraft

Project effects will be minimized by achieving the following objectives:

- Managing human-wildlife encounters and conflicts;
- Minimizing injury or mortality to wildlife from vehicular accidents;
- Protecting wildlife from contamination (e.g., ingestion of tailings water);
- Managing potential increases in hunting pressure due to improved access;
- Minimizing impacts to land users (i.e., guide outfitter, trap line holders, traditional land users);
- Monitor impacts to wildlife populations from the construction and operation of the mine.

The wildlife protection procedures and monitoring programs to meet these objectives are outlined in Sections 4 and 5 of this plan, respectively.

3. WILDLIFE RESOURCES

Habitats in the vicinity of the Project support a number of wildlife species including woodland caribou, moose, black bear, grizzly bear, wolf, fox, coyote, wolverine, marten, mink, lynx, river otter, beaver, small mammals, raptors, ptarmigan, waterfowl, shorebirds, and a variety of forest songbirds. The Finlayson Lake/River area and the east slope of the Pelly Mountains are part of the Tintina Trench migration corridor, and are used extensively by waterfowl and shorebirds including trumpeter swan and sand hill crane on their north-south migration (Sinclair et al., 2003). The lakes and small pond-wetland complexes in the region

provide breeding and migratory habitat for waterfowl, shorebirds, and other species. The mine site is situated in the southeast portion of the Finlayson Caribou Herd (FCH) range.

3.1 Valued Ecological and Cultural Components

At the beginning of the EA process in 2005, the selection of Valued Ecological and Cultural Components (VECCs) was obtained through consultation with various technical experts and stakeholders, including RRDC, the Kaska Forest Stewardship Council, Yukon Development Assessment Branch, Yukon Energy, Mines and Resources (EMR), Yukon Environment (YE), Canadian Wildlife Service, Yukon Land Use Planning Council, and the University of Alberta (YZC, 2005a). From this process, nine wildlife species/species-associations were identified as VECCs for the Project. The selected VECCs were expected to represent larger assemblages of wildlife species known to occur in the area, and were selected based on the applicability of the following criteria:

- Conservation status (i.e., *COSEWIC*, *CITES*, *Yukon Wildlife Act*);
- Ability of species to function as an indicator for a broader number of species;
- Potential to sustain project impacts;
- Species of cultural, social, economic and regional importance;
- Environmental Assessment Report Guidelines (Yukon ECO, 2005);
- Input from the review of the Biophysical Assessment Workplan submitted to regulators and RRDC in May/June 2005 (YZC, 2005b);
- Findings from previous field investigations; and,
- Input from the Project Technical Committee (meeting June 15, 2005).

The VECCs chosen during this process and additional rationale for selection are identified in Table 3. These VECCs are the main species considered for management, mitigation and monitoring under this plan. Waterfowl and shorebirds are also included as selected VECCs as they were identified as species of concern under *QML-0006 Section 12.3b*.

Table 3: Selected Wildlife VECCs based on 2005/2006 EA Consultation and QML-0006 Requirements

Selected VECC	Additional Rationale For VECC Selection
Woodland Caribou	<ul style="list-style-type: none"> - Listed as 'special concern' under <i>COSEWIC</i> (2005) - Species of regional importance
Moose	<ul style="list-style-type: none"> - Identified in regional context as significant moose population in Yukon.
Grizzly bear	<ul style="list-style-type: none"> - Listed as 'special concern' under <i>COSEWIC</i> (2005).
Lynx and Snowshoe hare	<ul style="list-style-type: none"> - Lynx is a prey specialist linked to snowshoe hare cycle. - Lynx is listed under <i>CITES Appendix II</i>.
American marten	<ul style="list-style-type: none"> - Socio-economic value as a furbearing species.
Song bird community	<ul style="list-style-type: none"> - Species listed under <i>COSEWIC</i> (2005) and the <i>Migratory Birds Convention Act</i>.
Trumpeter swan	<ul style="list-style-type: none"> - Breeding habitat in local study area. - Listed in <i>Yukon Wildlife Act</i> as 'specially protected' species. - Listed species under the <i>Migratory Birds Convention Act</i>.
Beaver	<ul style="list-style-type: none"> - Socio-economic value as a furbearing species. - Representative of other mammal species that use wetland habitats.
Thinhorn sheep	<ul style="list-style-type: none"> - Potential habitat occurrence in the local study area.
Waterfowl and Shorebirds	<ul style="list-style-type: none"> - Identified as a management concern under <i>QML-0006</i>.

3.2 Overview of Seasonal Use and Habitat for Selected Wildlife

Table 4 provides a summary of the key seasonal periods, occurrence, and available habitat for selected wildlife VECCs in the vicinity of the Wolverine Mine. The reference to the Wolverine Project Area (WPA) in the table is the local study area assessed during the EA phase of the Project (YZC, 2005a), and includes the mine site and access road plus a buffer covering an area of approximately 14,000 hectares (ha).

The assessment of habitat availability involved habitat suitability modelling as per Resource Inventory Committee (RIC) Standards (1999a), and subsequent field verification for moose, grizzly bear, lynx and snowshoe hare, marten, trumpeter swan, and beaver. The habitat classifications assigned for each assessed species is based on the percentage of the provincial/territorial best habitat, which is the benchmark habitat for a species against which all other habitats for that particular species is evaluated. The habitats for moose, marten, lynx and snowshoe hare are based on a four-class rating system, and include values of nil (0%), low (1-25%), moderate (26-75%), and high (76-100%) habitat classifications. While habitat for grizzly bear is based on a five-class rating system comprised of nil (0%), very low (1-5%), low (6-25%), moderate (26-50%), high (51-75%), and very high (76-100%) habitat classification values. The habitat classification of confirmed, unconfirmed and potential habitat, for trumpeter swan and beaver is based on aerial survey conducted in 2005. Fall and winter habitat availability for caribou is based on satellite interpretation of terrestrial lichen abundance and key wildlife habitat areas identified for the herd by Yukon Environment (YZC, 2005a).

Table 4: Wildlife Occurrence and Habitat Availability for Key Seasonal Periods in the Wolverine Project Area (YZC, 2005a)

Wildlife Species	Key Seasonal Periods	Wildlife Occurrence in the WPA	Habitat Availability in the WPA
Woodland Caribou	Calving (May/June)	Limited occurrence in the WPA during the calving season. Mapping based on YE surveys and telemetry studies from 1982-2004, indicate only two documented occurrences in the vicinity of the WPA.	Not assessed in 2005
	Post-Calving (June/July)	Limited occurrence documented in the WPA. This is based on less than 5% of all caribou observations (n=4,307), from 1982-2004 YE surveys and telemetry data being found in the WPA.	Not assessed in 2005
	Fall Rut (October)	Limited occurrence documented in the WPA. This is based on less than 5% of all caribou observations (n=34,471), from 1982-2004 YE surveys and telemetry data, being found in the WPA.	Assessment indicates 4,455 ha of available fall habitat in the WPA. Of this about 1,594 ha is confirmed habitat with the remainder being unconfirmed habitat.
	Winter (November-April)	Limited occurrence documented in the WPA. This is based on less than 5% of all caribou observations (n=14,149), from 1982-2004 YE surveys and telemetry data, being found in the WPA.	Assessment indicates about 1,047 ha of available winter habitat in the WPA. Of this 979 ha is confirmed habitat, and the remaining being unconfirmed habitat.
Moose	Spring/Summer (May-August)	No specific data is available for the WPA on moose density. Surveys conducted in the Finlayson-Francis Lake area in 1996 by YE indicated a density of 0.31 moose/km ² .	Not assessed in 2005

Table 4 (Cont'd): Wildlife Occurrence and Habitat Availability for Key Seasonal Periods in the Wolverine Project Area (YZC, 2005a)

Wildlife Species	Key Seasonal Periods	Wildlife Occurrence in the WPA	Habitat Availability in the WPA
Moose	Rut/Post-Rut (September-November)	No specific data is available for the WPA on moose density. Surveys conducted in the Finlayson-Francis Lake area in 1996 by YE indicated a density of 0.31 moose/km ² .	Not assessed in 2005
	Winter (December-April)	No specific data is available for the WPA on moose density. Surveys conducted in the Finlayson-Francis Lake area in 1996 by YE indicated a density of 0.31 moose/km ² .	Assessment indicates 9,488 ha of available winter habitat in the WPA. About 31% (2,941 ha) is low, 48% (4,554 ha) moderate, and 21% (1,993 ha) high value moose winter habitat.
Thinhorn Sheep	Lambing (May –June)	Since 2005, no visual confirmation of sheep presence or sign has been seen in the WPA. During aerial surveys, sheep were documented in portions of the Campbell Range (east of Wolverine Lake) and in close proximity to North Lakes (south of Wolverine Lake).	Based on habitat modelling, no suitable thinhorn sheep habitat is present in the WPA. Suitable habitat was identified south of the Wolverine Project in the vicinity of North Lakes.
	Winter		
Grizzly Bear	Spring	No specific quantitative data on grizzly bear population numbers or density is available for the WPA.	Assessment indicates 10,664 ha of available spring forage habitat. About 18% (1,920 ha) is very high, 22% (2,346 ha) high, 7% (747 ha) moderate, 10% (1,066 ha) low, and 43% (4,585 ha) very low value spring grizzly bear habitat.
Grizzly Bear	Summer/Fall	No specific quantitative data on grizzly bear population numbers or density is available for the WPA.	Assessment indicates 10,667 ha of available summer/fall forage habitat. In the WPA. About 13% (1,386 ha) is very high/high, 41% (4,374 ha) moderate, 30% (3,200 ha) low, and 16% (1,707 ha) very low value summer/fall forage habitat.
Lynx and Snowshoe Hare	All seasons	No specific quantitative data on lynx and snowshoe hare population numbers or density is available for the WPA.	Assessment indicates 10,758 ha of available lynx and snowshoe hare habitat in the WPA. About 44% (4,734 ha) high, 52% (5,594 ha) moderate, 4% (430 ha) low value habitat.
American Marten	All seasons	No specific quantitative data on marten population numbers or density is available for the WPA. Trapping records indicate marten are likely common in the WPA, and have been observed frequently at the Wolverine Lake exploration camp.	Assessment indicates 5,873 ha of available marten habitat in the WPA. About 20% (1,175 ha) is moderate, and 80% (4,698 ha) low value marten habitat.
Songbirds	Spring Migration (April-May)	43 passerine species were assessed during the EA phase (YZC, 2005a). No quantitative data on songbird densities is available for the WPA.	Songbirds use a diversity of habitats in the WPA. Habitat requirements and use varies by species and season.
	Breeding Season (May-July)		
	Fall Migration (August-October)		

Table 4 (Cont'd): Wildlife Occurrence and Habitat Availability for Key Seasonal Periods in the Wolverine Project Area (YZC, 2005a)

Wildlife Species	Key Seasonal Periods	Wildlife Occurrence in the WPA	Habitat Availability in the WPA
Trumpeter Swan	Spring Breeding (May-June)	One confirmed breeding pair of trumpeter swans with cygnets was documented in 2005. Additional swans may occur where suitable habitat is available.	Assessment indicates that available habitat for trumpeter swans in the WPA is about 585 ha. Of this 99% of the habitat is confirmed breeding habitat.
	Summer Nesting (July-September)		
Beaver	All seasons	Beaver colonies are common in the WPA. Aerial survey in 2005 indicated over 50 wetlands in the WPA had past or present sign of beavers. Between 1980 and 2001 the total beaver fur harvest from the WPA was approximately 1,300 pelts.	Assessment indicates available habitat for beaver in the WPA is about 1,714 ha. Of this 69% is confirmed habitat, and the remaining is potential habitat.

Notes: WPA = Wolverine Project Area; YE = Yukon Environment

4. WILDLIFE PROTECTION PROCEDURES

The Wolverine Project wildlife protection procedures presented in this section identify management and mitigation strategies or actions that will be implemented by YZC to minimize impacts to wildlife and their habitats, as well as land users (e.g., traditional/cultural use, guide outfitters, trappers), from routine activities and unplanned events associated with development and operation of the mine. These procedures were compiled from a variety of sources including recommendations from government agencies, consultation with First Nations and stakeholders, and by reviewing and incorporating current practices for mitigating wildlife impacts associated with mine development and operation.

All YZC personnel, contractors, and to the extent possible visitors, will be provided training on this WPP and the wildlife protection procedures contained therein as a component work site orientation. It is the responsibility of YZC management to ensure that personnel and contractors are familiar with and follow the procedures identified in this section of the WPP. Short stay visitors (e.g., less than 1 day) will be escorted by YZC personnel throughout the course of their duties at the mine site.

The wildlife protection procedures have been divided into five main categories and are detailed in the sections that follow. Reporting requirements pertaining to wildlife incidents and observations are summarized in Section 5.1, and detailed in Appendix C.

4.1 General: Wildlife-Human Conflicts

To minimize potential impacts to wildlife it is essential that work activities be carried out in a safe and responsible manner at all times. It may not always be possible to prevent wildlife-human interactions despite best efforts by mine personnel and contractors. Outlined below are the general procedures that will be carried out to minimize effects from the development and operation of the mine.

- 1) All mine personnel and contractors will be provided wildlife safety training, which will include bear awareness and safety training, as part of their work site orientation package.
- 2) Mine personnel and contractors will not attempt to handle nuisance or problem wildlife on their own. Site Management will be notified immediately if any wildlife are encountered while working at site.

- 3) The harassment of wildlife is prohibited under the *Yukon Wildlife Act*. Attempts to chase, catch, divert, follow, or otherwise harass wildlife by on-road or off-road vehicles, boats, aircraft, or on foot will not be permitted at any time.
- 4) Feeding wildlife is prohibited at all times, and includes travel to and from the mine site.
- 5) Personal pets, domestic or wild, will not be permitted. If a dog is required for deterrence purposes, written consent will be obtained from Site Management prior to an animal being brought to site.
- 6) Personal wildlife deterrents (e.g., air horns, bear spray, bear bangers) will be issued and carried by field crews (e.g., environment staff, geologists). Training on wildlife deterrents will be completed prior to issuance and use.
- 7) No hunting or fishing will be permitted by mine personnel or contractors at the mine site or on YZC's mining claims and leases at any time.
- 8) Personal firearms will not be permitted at the mine site at any time. This includes the transport, storage and use of firearms. The *Wolverine Project Firearm Policy* is provided in Appendix A.
- 9) Only Authorized Personnel, specified by Site Management, will be permitted to use non-lethal deterrent measures (e.g., rubber bullets, air horns, bear bangers) or lethal measures for the purpose of protecting person and property from wildlife. Lethal measures will only be used when all other practical means of averting the threat has been exhausted.
- 10) Littering will not be permitted at any time. Bear-proof storage containers located at multiple locations around the mine site will be used to dispose all refuse and garbage.
- 11) All work areas will be kept free of garbage and spills. All uncontained garbage or spills will be cleaned up immediately. Improperly disposed garbage, especially food or kitchen wastes, will be reported to Site Management as soon as possible.
- 12) All wastes will be disposed of according to the *General Site Plan V2008-04*, and subsequently the *Waste Management Plan* (once completed), as well as the *Commercial Dump Permit #81-014*, *Special Waste Permit #43-046*, and *Air Emissions Permit #4201-60-021*.
- 13) The landfill and incinerator will be enclosed in an electrified fence, and operated according to *Commercial Dump Permit #81-014* and *Air Emission Permit #4201-60-021*.
- 14) Fencing will be installed, if necessary, around selected mine site infrastructure (e.g., camp complex) to prevent wildlife access. YZC will re-assess this requirement once construction is complete, and monitoring program data has been integrated, and input provided from the WTC.
- 15) Hiking in the vicinity of the mine site will be permitted during non-working hours. Areas that will be excluded from this activity include sensitive and critical habitat areas identified by YZC in consultation with the WTC.
- 16) Research and monitoring guidelines, detailed in Appendix B, will be followed for the purpose of minimizing disturbance to wildlife and habitats from these activities.
- 17) Wildlife incidents (e.g., traffic accidents), observations of wildlife acting in a non-normal way, and nuisance or problem animals will be reported to Site Management immediately. Any observations of

wildlife behaving in a normal way will be reported to Site Management within 24 hours. Reporting procedures are detailed in Appendix C.

4.2 Land Use

In order to minimize impacts to traditional land users and guide outfitters the following procedures will be implemented.

- 1) Trapping will not be permitted on the Wolverine Project mining claims, but is not limited in the general area. RRDC, who holds the group trap line, is compensated bi-annually through the Land Use Interruption Supplement outlined in the *Socio-Economic Participation Agreement*. RRDC will be contacted to trap nuisance animals when necessary.
- 2) Use of areas for traditional land use practices (e.g., hunting, fishing, berry picking) in the general vicinity of Wolverine Lake is not restricted as long as these areas are accessed by a means other than the mine access road or airstrip.
- 3) Each spring, the Environmental Coordinator or designate will consult with Teslin Outfitters on their planned outfitting activities for the upcoming hunting season. Identified active outfitting areas will be integrated into project planning, and will be provided to the aircraft and helicopter contractors, as needed. To the extent possible aircraft will avoid operating in active outfitting areas during specified periods.

4.3 Transportation: Roads and Aircraft

It is important that all activities along transportation routes and on-road and off-road vehicles, heavy equipment, aircraft and helicopters are used in a safe and responsible manner to ensure that impacts to wildlife are minimized.

- 1) Access will be restricted by locked gates at ~0.1 km and ~0.5 km to prevent public use of the mine access road.
- 2) Maximum speed limit on the access road will be 60 km/h unless otherwise posted. Travel speeds will be adjusted according to road conditions, weather, and wildlife presence when and where required.
- 3) Signs will be posted to alert drivers of possible wildlife presence such as migration corridors, crossing points, sensitive habitats, or high use areas. Reduced travel speeds will be posted where required.
- 4) Minimum traffic levels will be maintained along the mine access road to the extent possible.
- 5) Wildlife will have the right-of-way at the mine site and along the access and site roads when it is judged safe to allow passage.
- 6) The authorized use of on-road and off-road vehicles will be restricted to established roads and designated trails at the mine site except to access monitoring sites and remote communications equipment. Use of private and recreational vehicles will be prohibited at all times.
- 7) To improve visibility from dust, the mine access road and site roads will be sprayed with water during dry periods as needed.

- 8) In winter, the mine access road and site roads will be ploughed, and products having low environmental impact (e.g., sand, gravel, non-palatable salts such as lithium chloride) will be used as needed to ensure safe road conditions.
- 9) Push-outs will be ploughed along the access road in winter as required depending on the presence of wildlife trails or crossings, snow height, and road limitations.
- 10) Any observations of wildlife will be reported to Site Management as soon as possible.
- 11) Wildlife incidents (e.g., traffic accidents) will be reported to Site Management immediately.
- 12) The guidelines developed by MPERG (2008) and MERG (2002) have been adapted to minimize potential wildlife harassment from aircraft and helicopter over flights. These guidelines will be provided to aircraft and helicopter service providers.
 - a. A minimum flight altitude of 300 m (or 1,000 ft) above ground level will be maintained to the extent possible.
 - b. All reasonable efforts will be made to avoid sensitive habitats during key seasonal periods, and will be identified in consultation with the WTC.
 - c. When sensitive habitats cannot be avoided, a minimum over flight altitude of 600 m (or 2,000 ft) will be maintained to the extent possible.
 - d. Whenever possible, aircraft will avoid sheep ranges by 3.5 km or a ridge will be placed between the aircraft and sheep range, and aircraft will fly at altitudes below sheep if they are encountered.
 - e. To the extent possible aircraft will avoid over flights in proximity to Wolverine Lake, Little Wolverine Lake, Little Jimmy Lake, and Frances Lake.
 - f. Purposefully flying towards, hovering and circling wildlife will not be permitted.

4.4 Wildlife Habitat Protection

All reasonable efforts will be made to minimize impacts and reclaim disturbed habitats through all phases of the Project. Procedures to manage potential impacts to wildlife from direct and indirect habitat loss are outlined below.

- 1) Vegetated buffers adjacent to mine facilities and roads will be maintained to the extent possible. Exceptions will include areas that will be managed for wildlife and human safety.
- 2) Any habitat feature (e.g., nest, den, mineral lick, etc.) that is encountered during the course of work activities by mine personnel or contractors will be reported to Site Management immediately for follow-up actions as required.
- 3) Reclamation and seeding along roads and trails will be at the direction of Site Management according to the recommendations provided in the *Reclamation and Closure Plan V2008-02* and subsequent updates. Unpalatable native seed mixes will be used whenever possible to minimize wildlife attraction to re-vegetated areas.

- 4) The destruction or interference of a beaver dam, or the den, lair or nest of any wildlife will not be permitted at any time, and is also an offence under the *Yukon Wildlife Act*. The Conservation Officer in Ross River will be contacted by Site Management if exceptions to the management provisions outlined in the *Act* are required.

4.5 Tailings Facility Operation and Management

To minimize impacts associated with the tailings facility, the following procedures will be followed.

- 1) Seepage from the tailings pond will be minimized through the installation of an impermeable basin liner.
- 2) Wildlife monitoring will be carried out in the vicinity of the tailings facility on a regular basis.
- 3) Fencing will be installed around selected areas of the tailings facility during operations if required. Determination of the need for the installation of fencing will be based on the outcomes of the monitoring programs, and input from the WTC.
- 4) Routine monitoring and surveillance activities (e.g., water and sediment quality, aquatic life, etc.) will be undertaken throughout the life of the Project as per licence requirements.
- 5) Wildlife deterrent measures (e.g., automated horns, aural calls, bangers, etc.) in the vicinity of the tailings facility will be installed and used as required with input from the WTC.

5. MONITORING

The Wolverine Project wildlife monitoring programs have been developed to monitor wildlife activity in the Project area, to assess changes to wildlife and habitat resources, and to evaluate whether mitigation measures outlined in Section 4 are effective in managing project effects on wildlife. These programs are based on information assessed during the Environmental Assessment completed for the Project in 2005, and input from the WTC. YZC, with input from the WTC, will apply the principles of adaptive management based on the outcomes of the monitoring programs.

There are five monitoring programs planned within the Project area, as well as regional monitoring programs that are conducted by YE with the participation of other stakeholders. Guidelines for minimizing disturbance and harassment to wildlife and their habitats from monitoring activities at the Project is provided in Appendix B. Monitoring program summaries are provided below, and the protocols for each program is detailed in Appendix C to G.

5.1 Wildlife Records Program

The purpose of the *Wildlife Records Program* is to provide incidental data to support more regimented wildlife monitoring programs, and to identify existing or potential issues and areas of concern between wildlife and project components. This program will involve the reporting, by mine personnel and contractors, of wildlife observations and incidents encountered during mine development and operation. Wildlife observations include visual observations of wildlife behaving in a normal way, and wildlife sign (e.g., tracks, scat, nests, dens, etc.). Wildlife incidents include close or aggressive encounters, unusual or erratic behaviour, traffic accidents or near misses, and dead or injured wildlife. Reporting of wildlife observations and incidents will occur on an ongoing basis. All wildlife incidents will be reported to Site Management at

the time they occur or as soon as reasonably possible; and wildlife observations within 24 hours of sighting. The protocol for reporting wildlife incidents and observations is provided in Appendix C.

5.2 Tailings Facility Monitoring

The purpose of this program is to monitor waterfowl and shorebird occurrence and distribution during the fall and spring migration periods, and assess the effectiveness of mitigation measures in managing impacts from the operation of the tailings facility. Ground based observation stations will be used to survey the tailings facility and control sites. The survey periods will coincide with spring (~April/May) and fall (~August/September) migration (Sinclair et al., 2003), and will be carried out on a weekly basis for the duration of each migration period. Field surveys will involve counting all birds using each survey area by species, and sex and age class, where possible, and documenting wetland habitat characteristics as per RIC (1997 and 1999b). The monitoring protocol for this program is provided in Appendix D.

5.3 Winter Wildlife Monitoring

The purpose of this program is to monitor the occurrence, distribution and movement of wildlife in the winter months, and assess if effects to wildlife are occurring from mine activities. Transects will be established near project components (e.g., mine site, access road), and in undisturbed and/or control areas. The survey period will be from about mid-October to late April, depending on winter weather and snow conditions. Surveys will be completed at minimum once per month with the goal of completing a minimum of nine sampling sessions each winter season. Field surveys will involve documenting wildlife or wildlife sign (e.g., tracks, scat, and pellets) that cross the survey transect as per standard survey methods (e.g., Hofer, 2007; RIC 1998, 1999c and 2006). Snow depths will also be taken at regular intervals (D'Eon, 2004; RIC, 2006), and general habitat information will be recorded. The monitoring protocol for this program is provided in Appendix E.

5.4 Monitoring of Metal Levels in Vegetation

The purpose of this program is to assess baseline metal concentrations in selected wildlife forage plants (lichen, horsetail, and willow species) and to determine whether plant metal levels increase from mine operation. A series of transects will be established and systematically sampled. Vegetation samples will be sent to accredited laboratory for analysis of metals levels using ICP-MS. Baseline sampling for small mammals will occur in 2009, and subsequent operational monitoring will start in 2011 and continue every three years (e.g., 2014, 2017) thereafter until closure, or monitoring data indicates no contamination and the WTC is in agreement. The monitoring protocol for this program is provided in Appendix F.

5.5 Monitoring of Metal Levels in Small Mammals

The purpose of this program is to assess baseline metal concentrations in wildlife, and determine whether levels of metals in wildlife increase from mine operation. Small mammals including voles, mice, lemmings, shrews, and possibly chipmunks, and squirrels, are the focal species for this program. Trapping transects either 150 m or 300 m in length will be established. For small mammals except shrews, trapping stations will be placed at 15 m intervals along each transect with two Museum Special snap traps installed at each station. Pitfall traps, to capture shrews, will be installed approximately every 60 m along each transect. Sampling will occur in August with each trapping session being four trap-nights in duration. Traps will be checked each morning, and all animals captured will be collected for sampling. Collected specimens will be processed by an accredited laboratory, and tissues (liver, kidney, and muscle) analyzed using ICP-MS. Baseline sampling for small mammals will occur in 2009, and subsequent operational monitoring will start in 2011 and continue every three years (e.g., 2014, 2017) thereafter until closure, or monitoring data indicates no contamination and the WTC is in agreement. The monitoring protocol for this program is provided in Appendix G.

5.6 Regional Wildlife Monitoring Programs

Regional programs are those studies or surveys with broad geographic scopes that consider the requirements of wildlife with larger range requirements (e.g., caribou, bears). For the Wolverine Project, these programs are typically led by the Yukon Government and are collaborative encouraging participation by First Nations and other stakeholders in the region. YZC has financially contributed to caribou surveys since 2006 for the Finlayson Caribou Herd (FCH), and will continue to partner on these programs. Starting in 2009, YZC will contribute \$10,000 per year to the FCH fall survey.

YZC will consider supporting other regional monitoring programs. Submission of a proposal will be required that outlines study objectives, and a cost estimate that includes the requested funding contribution and/or in-kind support. In order for a project proposal to be considered by YZC, it must be relevant to its regulatory obligations and operations (e.g., within the Finlayson Region).

6. MONITORING PROGRAM MANAGEMENT AND REPORTING

A summary of survey frequency and schedule for field work schedules for each monitoring program component is provided in Table 5.

Table 5: Wolverine Project Wildlife Monitoring Program Summary

Program	Frequency of Survey	Schedule of Field/Program Activities
Wildlife Records Program	January 1 to December 31	Ongoing (construction, operations, and closure until personnel or contractors no longer on site)
Tailings Facility Monitoring	Spring (~April/May) and fall (August/September) migration periods. Program to start in fall 2009, and continue on an annual basis each year thereafter until closure.	Surveys will be carried out at minimum once per week during the spring and fall migration periods.
Winter Wildlife Monitoring	From about October to April each year starting winter 2009/10. Program duration each winter will be dependent on weather and snow conditions. Surveys will continue on an annual basis until closure.	Surveys will be completed at least once every 4 weeks. A minimum of 9 sampling sessions will be carried out per winter season.
Metal Levels in Vegetation	Baseline monitoring will occur in 2009. Operational monitoring will start in 2011, and occur every three years (2014, 2017) thereafter until closure, or monitoring data indicates no contamination and WTC is in agreement.	Collection of vegetation samples will be carried out from about late-July to early August during peak growing season.
Metal Levels in Small Mammals	Baseline monitoring will occur in 2009. Operational monitoring will start in 2011, and occur every three years (2014, 2017) thereafter until closure, or monitoring data indicates no contamination and WTC is in agreement.	Trapping will be carried out in August after completion of the breeding season. Each trap session will be 4-trap nights in duration.
Regional Wildlife Monitoring Program: Finlayson Caribou Herd Fall Composition Counts	Aerial surveys to be carried out by YE during the fall rut period on annual basis.	Late- September to early October.

A YZC Environmental Scientist or designate will be responsible for ensuring that monitoring program activities follow the procedures outlined in the protocol documents, datasheets are complete and accurate,

samples are packaged, labelled and stored correctly, and data management and entry procedures are accurate and complete. Additional data management and reporting requirements are provided in the protocol documents provided in Appendices C to G.

7. REFERENCES

- D'Eon, R.G. 2004. Snow Depths as a Function of Canopy Cover and Other Site Attributes in a Forested Ungulate Winter Range in Southeast British Columbia. *BC Journal of Ecosystems and Management*, 3(2): 1-9. Available online at: <http://www.forex.org/jem/2004/vol3/no2/art5.html>. Accessed on January 6, 2009.
- Hofer, E. 2007. Yukon Ecological Monitoring Protocols (2007 ed.). Kluane Monitoring Handbook. Available at: <http://www.zoology.ubc.ca/~krebs/kluane.html>. Accessed on January 5, 2009.
- Mining Environment Research Group (MERG). 2002. *Flying in Sheep Country: How to Minimize Disturbance from Aircraft*. Whitehorse, YT.
- Mining and Petroleum Environmental Research Group (MPERG). 2008. *Flying in Caribou Country: How to Minimize Disturbance from Aircraft*. Whitehorse, YT.
- Resource Inventory Committee (RIC). 1997. *Standardized Inventory Methods for Components of British Columbia's Biodiversity: Shorebirds Plovers, Oystercatchers, Stilts, Avocets, Sandpipers, Phalaropes and Allies (v.1.1)*. BC Ministry of Environment, Lands, and Parks, Victoria, BC.
- Resource Inventory Committee (RIC). 1998. *Inventory Methods for Marten and Weasels. Standards for Components of British Columbia's Biodiversity No. 24*. BC Ministry of Environment, Lands and Parks, Victoria, BC.
- Resource Inventory Committee (RIC). 1999a. *British Columbia Wildlife Habitat Rating Standards v. 2.0*. Prepared by the BC Ministry of Environment, Lands, and Parks, Victoria, BC.
- Resource Inventory Committee (RIC). 1999b. *Inventory Methods for Waterfowl and Allied Species: Loons, Grebes, Swans, Geese, Ducks, American Coot and Sandhill Crane (v. 2.0)*. Standards for Components of British Columbia's Biodiversity No. 18. BC Ministry of Environment, Lands, and Parks, Victoria, BC.
- Resource Inventory Committee (RIC). 1999c. *Inventory Methods for Medium-sized Territorial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher, and Badger. Standards for Components of British Columbia's Biodiversity No. 25*. Prepared by the Ministry of Environment, Lands and Parks, Victoria, BC.
- Resource Inventory Committee (RIC). 2006. *Ground-based Inventory Methods for Ungulate Snow-track Surveys. Standards for Components of British Columbia's Biodiversity No. 33a*. BC Ministry of Environment, Victoria, BC.
- Sinclair, P.H., Nixon, W.A., Eckert, C.D., and N.L. Hughes. 2003. *Birds of the Yukon Territory*. UBC Press, University of British Columbia, Vancouver, BC. 595 p.
- Yukon Executive Council Office (ECO). 2005. *Information Guidelines for the Preparation of an Environmental Assessment Reporting for Yukon Zinc Corporation's Wolverine Project*. Whitehorse, YT.
- Yukon Zinc Corporation (YZC). 2005a. *Wolverine Project Environmental Assessment Report, October 2005*. Prepared by AXYS Environmental Consulting Ltd.
- Yukon Zinc Corporation (YZC). 2005b. *Wolverine Project Biophysical Assessment Work Plan: Physiography, Surficial Geology, Climate, Aquatic Resources, Terrestrial Resources*, May 2, 2005.

Appendix A YZC Environmental Policies



Environmental Protection Policy

Environmental protection is a corporate priority for Yukon Zinc Corporation (YZC) and it is the company's commitment to strive to preserve and protect the environment for the future, while providing a safe and responsible operation. YZC will develop its natural resources for the benefit of its employees, shareholders, local communities and First Nations. Managing programs and activities is a key priority to ensure a high standard and to strive for continuous improvement in performance.

Yukon Zinc Corporation will develop and operate the Wolverine Project to minimize the geographic extent, duration, and magnitude of effects of project development and operations on valued ecosystem and cultural components. The Project has been designed for eventual permanent, passive closure, will be managed to minimize risk of potentially harmful incidents, and will manage its business under the following environmental policies.

POLICIES:

1. Integrate environmental policies, programs, and practices into all activities of the organization.
2. Monitor the performance of environmental programs and management systems to ensure compliance with company and legislative requirements.
3. Establish an ongoing program of review and improvement of environmental performance.
4. Identify, assess, and manage environmental risks.
5. Develop, maintain, and test emergency preparedness plans to ensure protection of the environment, workers, and the public.
6. Work with government and the public to develop effective, efficient, and equitable measures to protect the environment based on sound science.
7. Require contractors to comply with company environmental policies and work co-operatively to improve environmental performance.
8. Encourage dialogue on environmental issues with employees and public and be responsive to concerns.
9. Ensure that all employees understand and are able to fulfill their environmental responsibilities.
10. Reclaim sites in accordance with site-specific criteria in a planned and timely manner.



Health and Safety Policy

Health and safety is an integral part of our everyday work and it is Yukon Zinc Corporation's (YZC) commitment to provide a safe and healthy working environment. YZC will maintain and develop safe work conditions and practices to comply with all applicable laws governing its activities. YZC considers the safety and health of its workers to be of the utmost importance and each member of the management team and every individual has the responsibility to ensure that we all work towards maintaining a high standard in health and safety while promoting continuous improvement in performance.

PRINCIPLES:

- All hazards can be safeguarded
- Working safely must become the natural way to work
- Effective leadership is essential to success
- Achieving and maintaining excellence in safety is a never-ending process
- Injuries are not okay
- Employees must be involved in developing safe practices
- Management provides leadership and direction in safety
- Health and safety is a part of all business decisions
- Working safely is a condition of employment

Yukon Zinc is committed to protecting and promoting the health of all employees by providing a safe, healthy physical environment and supportive workplace culture and will manage its business under the following safety policies.

POLICIES:

1. Conduct business in a manner that will eliminate, minimize or control hazards to ensure the health, safety and security of its employees, contractors, the community and the environment
2. Provide and maintain a safe and healthy workplace for all individuals including employees, contractors and visitors
3. Train and motivate all individuals to work in a safe and responsible manner
4. Meet legislative and regulatory requirements
5. Ensure safety equipment, personal protective equipment and protective clothing are appropriate to the activities of each employee, contractors, and visitors
6. Strive for continual improvement in our health and safety performance by setting and reviewing achievable targets
7. Hold each individual accountable for health and safety



Heritage Resource Protection Policy

Yukon Zinc Corporation recognizes the value that heritage resources have for the Kaska and Yukoners. Yukon Zinc is committed to protecting Yukon heritage and will comply with the *Yukon Historic Resource Act*, the *Yukon Archaeological Sites Regulation*, and agreements with the Kaska. Yukon Zinc is committed to building awareness and respect for heritage resources. To accomplish these objectives Yukon Zinc will:

- Develop a heritage resource protection plan
- Incorporate Kaska views and traditional knowledge in planning, development and operations
- Incorporate heritage resource protection into all activities
- Deliver heritage and cultural awareness training to our employees and contractors
- Maintain the confidentiality of Kaska traditional knowledge and heritage sites



Wolverine Project Firearm Policy

- All firearms are prohibited at the Yukon Zinc Corporation, Wolverine Project site unless otherwise authorized by YZC Management.
- Firearms are to only be used for the protection of personnel and property in the event of dangerous wildlife.
- All hunting of wildlife or recreational shooting is strictly prohibited.
- All authorized firearms at the Wolverine Project site are under direct control of the YZC Management or an employee(s) designated by YZC Management.
- As described in the *Yukon Occupational Health and Safety Regulations* “any worker who is required to use, handle or otherwise have control of a firearm shall:
 - a) have successfully completed the Canadian Firearms Safety Course, as given by an instructor who is designated by a chief firearms officer, and
 - b) have demonstrated proficiency with that firearm to the employer.”
- Every designated employee who handles firearms in the course of their duties, must hold a valid Federal Firearms Possession License with non-restricted acquisition privileges.
- All firearms must be handled and stored in accordance with the federal *Firearms Act*. This includes, but is not limited to, locking mechanisms on all firearms when not in use and proper storage of ammunition.

Appendix B Guidelines for Minimizing Disturbance to Wildlife and the Habitats from Monitoring Activities

OBJECTIVES

These guidelines have been developed by YZC in partnership with the Wolverine Project Wildlife Technical Committee to:

- Minimize stress and/or disturbance to wildlife from monitoring activities.
- Reduce impacts to habitats or sensitive ecosystems.
- Ensure safety of all personnel undertaking field studies.

The guidelines provided below were adapted from the Canadian Council on Animal Care (2003)¹ and RIC (1997)².

GUIDELINES

- Field studies will be carried out according to standard sampling methods that minimize impacts to wildlife from research activities.
- Field personnel will be sensitive to wildlife responses to human presence, especially animals with dependent young, to the extent possible.
- Field visits and activities will be timed so that impacts to wildlife during their most sensitive periods (e.g., breeding) are minimized or avoided whenever possible.
- To minimize investigator disturbance during field studies, consistency in survey timing and intensity will be maintained to the extent possible.
- Field personnel will be familiar and trained in current field survey/sampling methodologies that minimize disturbance to wildlife, as appropriate, to meet the objectives of the studies.
- To minimize disturbance from revisiting field sites due to lost or missed data, field personnel will ensure that all data collected is accurate and complete, and samples are taken correctly.
- The use of on-road and off-road vehicles will be restricted to designated roads and trails at the Wolverine Project to the extent possible.
- The footprint of monitoring sites will only be as large as necessary to meet the objectives of the study.
- The collection of biological samples (e.g., vegetation, animals) will be limited to the amount required to meet the objectives of the monitoring program.

¹ Canadian Council on Animal Care. 2003. CCAC Guidelines on: the Care and Use of Wildlife. Ottawa, ON. website: <http://www.ccac.ca/>

² Resource Inventory Committee (RIC). 1997. Live Animal Capture and Handling Guidelines for Wildlife Mammals, Birds, Amphibians and Reptiles. Standards for Components of British Columbia's Biodiversity No. 3. BC Ministry of Environment, Lands and Parks, Victoria, BC.

- Field equipment and supplies brought into the field to conduct the studies will be brought out at the completion of the program.
- All food and domestic wastes (e.g., sandwich wrappers, apple cores, banana peels) will be removed from the field and disposed of in bear proof storage containers at designated locations around the mine site.
- Field personnel will be familiar with the local weather conditions , and YZC safety and emergency procedures for working in these environments.
- Field personnel will be trained in the use of off-road vehicles and other field equipment necessary to complete the monitoring programs.
- All field personnel will receive wildlife safety training as a component of their work site orientation and training at the time of hire.
- Field personnel will receive training and be required to carry personal wildlife deterrents in the field to assist in management of human-wildlife encounters or conflicts should they occur.
- All field crews will be required to carry handheld radios for the purpose of maintaining contact with Site Management. As required, regular check-in times will be established with their Supervisor before heading into the field.

Appendix C Wildlife Records Program: Procedures for Reporting Wildlife Incidents and Observations

PURPOSE

The reporting of wildlife observations and incidents supports the *Wildlife Records Program* for the Wolverine Project. The purpose of the program is to provide incidental data to support the more regimented wildlife monitoring programs, and to identify existing or potential issues and areas of concern between wildlife and project components.

WHO DOES THESE PROCEDURES APPLY TO?

The reporting of wildlife incidents and observations applies to all mine personnel and contractors working at the Wolverine Project.

REPORTING PROCEDURES

1. Wildlife incident Reporting:

Wildlife incidents include observations of wildlife acting in a non-normal way, close or aggressive encounters, unusual or erratic behaviour, traffic accidents or near misses, and dead or injured wildlife.

Incidents involving wildlife will be reported to Site Management or your Supervisor as soon as it occurs or the animal is encountered. Information reported to Site Management will include:

- Date and time of incident
- Wildlife species and number of animals involved
- Location of incident (e.g., UTM coordinates, road km, facility, etc.)
- Type of incident (e.g., vehicle collision, near miss, encounter, nuisance/problem wildlife interaction)
- Incident outcome (e.g., injury, mortality, defensive behaviour, no injury, management action)
- Description of incident and outcome
- Activity of wildlife before the incident
- Habitat type (e.g., road, camp, wetland, etc.)
- Could the incident have been prevented?

Incidents will be detailed on the *Wolverine Project Wildlife Incident Report* form. The form will be available from Site Management and/or the Environmental Scientist or designate.

Note: Incidents (e.g., traffic accidents) that occur along the Robert Campbell Highway will be reported to Site Management as soon as reasonably possible.

2. Wildlife Observation Reporting:

Wildlife observations include visual observations of wildlife behaving in a normal way, and any wildlife sign (e.g., tracks, trails, scat, nests, dens, mineral licks, etc.) encountered.

Observations of wildlife will be reported to Site Management or your Supervisor within 24 hours or as soon as reasonably possible. Information reported will include:

- Date and time of observation
- Wildlife species and number of animals seen
- Sex class (i.e., male, female, or unclassified) and age class (i.e., adult, juvenile)
- Activity of wildlife (e.g., walking, flying, resting or bedded down, swimming, etc.)
- Location (e.g., UTM coordinates, road km, facility, etc.)
- Wildlife location (i.e., distance and direction from the observer)
- Weather (i.e., temperature, wind, precipitation)
- General comments (e.g., behaviour of animal, habitat, reaction to disturbance, etc.)

Observations will be reported in writing on the *Wolverine Project Wildlife Observation Form*, or verbally with the information recorded on the form. The form will be available from Site Management and/or the Environmental Scientist or designate.

FOLLOW-UP PROCEDURES

1. Site Management or designate will be responsible for:

- Ensuring the *Wolverine Project Wildlife Incident Report* form is complete, and appropriate follow-up response or actions have been taken and documented.
- Following up with the Conservation Officer on wildlife incidents and response actions. Contact information is provided in Appendix H.
- In circumstances where the appropriate course of action is unclear (e.g., responding to problem wildlife), Site Management will consult with the Environmental Scientist and/or Conservation Officer on appropriate mitigation or management measures before implementing corrective action whenever possible.
- Advising YZC Corporate of wildlife incidents as they occur. Contact information is provided in Appendix H.

2. Environmental Scientist or designate will be responsible for:

- See Site Management responsibilities above.
- Collecting wildlife incident and observation information from Site Management and Supervisors, and entering reported data into the electronic *Wolverine Project Wildlife Log*.
- Weekly review of the *Wolverine Project Wildlife Log* to assess if there are any issues or areas of concern that need to be addressed. If issues are identified, course of action will be determined in consultation with Site Management. The WTC will be consulted when additional technical expertise is required.
- Quarterly QA/QC of the *Wolverine Project Wildlife Log* data entry and management.
- Development of reports to support program reporting requirements.
- Coordination and reporting of wildlife information, to the WTC.

REPORTING

On a biannual basis, a summary report will be prepared by YZC. The report will include monitoring procedures, data results and analyses, and appendices with original field data. The purpose of the summary reports will be to provide a detailed record of monitoring program results, a tool for monitoring impacts to wildlife and their habitats, and to facilitate detailed review by the WTC. The report will subsequently be included in the *Wolverine Project Annual Report* as required by *QML-0006*.

DATA FORMS

The data forms that will be used for this program are provided below. The data forms will be reviewed and modified as required based on the results of the monitoring program.

1. Wolverine Project Wildlife Incident Report
2. Wolverine Project Wildlife Observation Form
3. Wolverine Project Wildlife Log



**WOLVERINE PROJECT
WILDLIFE INCIDENT REPORT**

Each time a wildlife incident is reported to Site Management by YZC personnel or contractors, an incident report will be completed immediately thereafter.

GENERAL INFORMATION

Date/Time: _____ Employee/Contractor Name: _____
Name of Supervisor or Manager: _____ Shift: _____
Reported Incident to: _____ Date/Time: _____

DETAILS OF INCIDENT

1. Wildlife Species: _____ Number of Animals: _____

2. Incident Type (circle one): vehicle collision near miss encounter nuisance/problem interaction
Other, specify: _____
If vehicle involved specify type: truck, ATV, heavy equipment, aircraft, or helicopter

3. Location (e.g., GPS location, road km , facility):

4. Incident Outcome (circle one): injury mortality defensive behaviour no injury management action
Other, specify: _____

5. Description of Incident and Outcome: _____

6. Activity of wildlife before incident: _____

7. Type of Habitat (e.g., road, camp, wetlands, etc): _____

8. Could the incident have been prevented? Circle one. Yes No Uncertain
If yes, describe how. _____

Please submit completed forms to the Environmental Scientist or your Supervisor/Manager.



**WOLVERINE PROJECT
WILDLIFE OBSERVATION FORM**

Each time wildlife or wildlife sign (e.g. tracks, scat, dens, nests, mineral licks, etc.) are seen by YZC personnel or contractors, the observation will be reported in writing on the Wolverine Project Wildlife Observation Form or verbally with the information recorded on the form.

Observer: _____ Date: _____ Time (24-hour): _____

Weather: Temp. (°C): _____ Precip: _____ Wind: _____ Other: _____

Wildlife Species: _____ Number of Animals: _____

No. Adults: Female: _____ Male: _____ Unclassified: _____ No. Juveniles: _____

Wildlife Activity (e.g., feeding, running, walking, flying, swimming, etc.): _____

Location (i.e., in UTM's, road km, facility, etc.): _____

Habitat (e.g., road, wetland, facility, etc.): _____

Other comments (e.g., behaviour, reaction to disturbance, etc.): _____

Appendix D Tailings Facility Monitoring Protocol

PURPOSE

The purpose of this program is to monitor waterfowl and shorebird occurrence and distribution during the spring and fall migration periods, and assess the effectiveness of mitigation measures in managing the impacts from the operation of the tailings facility.

FOCAL SPECIES

This program will focus on migratory waterfowl and shorebirds during the spring and fall migration periods. Species that have been documented in the Wolverine Project Area (WPA) previously include bufflehead, common loon, common merganser, horned grebe, mallard, Canada goose, northern pintail, red-breasted merganser, red-throated loon, ring-necked duck, sandhill crane, trumpeter swan, semi-palmated plover, solitary sandpiper, spotted sandpiper, arctic tern, herring gull, mew gull, sora and sanderling (YZC, 2005)¹.

STUDY AREA

The study areas for the baseline and effects monitoring are the Mine Site Study Area (MSSA) and the Putt Creek Study Area (PCSA). These study areas roughly correspond to the wildlife local study area that was assessed during the Environmental Assessment (EA) phase of the Wolverine Project (YZC, 2005)². The MSSA is about 3,240 ha, and includes the mine site infrastructure (i.e., mine portal, tailings facility, camp complex, industrial complex, airstrip and landfill). The PCSA is about 7,920 ha, and includes the the access road from the mine site to its junction with the Robert Campbell Highway. The control/reference area included in the program is the Money Creek Reference Area (MCRA). The MCRA is about 2,560 ha and is situated in the Money Creek watershed, and is similar in ecosystem composition to the MSSA and PCSA. The study areas for the monitoring program are shown on Figure 1.

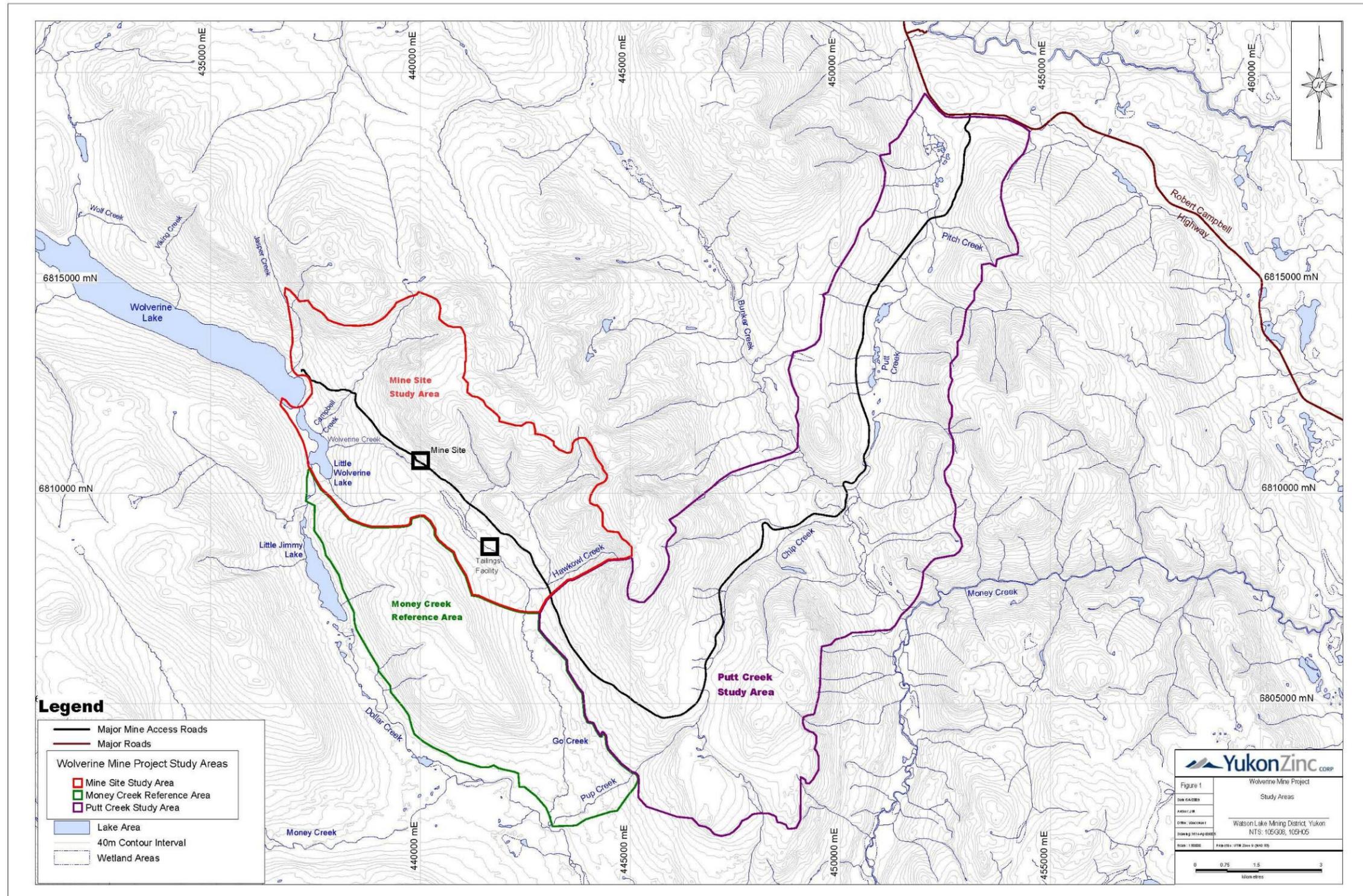
STUDY DESIGN

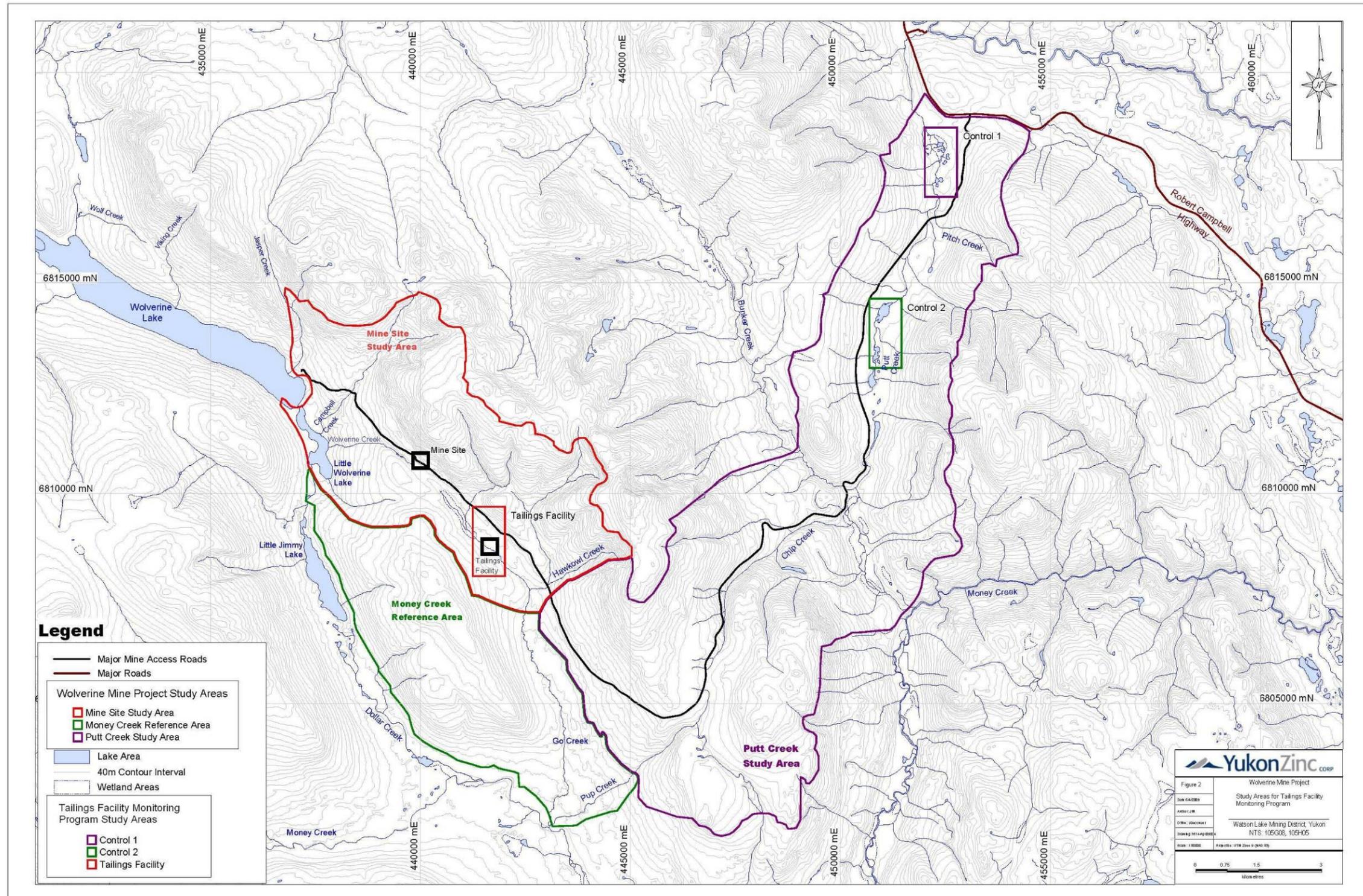
The tailings facility will be the primary survey area, along with two control areas shown on Figure 2. Both of the control areas are located in the PCSA and are expected to be relatively similar to the post-operations tailings pond. Surveys will coincide with the spring (~April/May) and fall (~August/September) migratory periods (Sinclair et al., 2003)³, and will be carried out at minimum once per week for the duration of each migratory period. Monitoring is planned to start fall 2009, and will continue on an annual basis through the operations phase. Post-operations monitoring frequency will coincide with other planned monitoring activities at the mine site.

¹ Yukon Zinc Corporation (YZC). 2005. Wolverine Project Environmental Assessment Report, October 2005. Prepared by AXYS Environmental Ltd.

² Yukon Zinc Corporation (YZC). 2005. Wolverine Project Environmental Assessment Report, October 2005. Prepared by AXYS Environmental Consulting Ltd.

³ Sinclair, P.H., Nixon, W.A., Eckert, C.D., and N.L. Hughes. 2003. Birds of the Yukon Territory. UBC Press, University of British Columbia, Vancouver, BC.595 p.





The number of birds using each survey area (tailings facility, and control areas) during each survey period will be recorded by species from observation stations established in each survey area, and classified according to age and sex class, if possible. Wetland characteristics will be also be documented as per RIC (1997⁴, 1999⁵) during each survey period (i.e., spring and fall migration survey period). Other species observed in the vicinity of the survey areas will be documented incidental to monitoring program activities.

PERSONNEL AND TRAINING

A field crew comprised of two people (i.e., Environmental Scientist and Environmental Technician or designates) will be required to complete the work under this monitoring program. The responsibilities of each person are outlined below.

- A YZC Environmental Scientist or designate will be responsible for ensuring that the monitoring program is conducted according to current standards and practices. In addition to participating in the field program as required, the Scientist will carry out quality control measures to ensure data is complete and accurate, oversee data management and entry, and ensure proper processing of samples, completion of chain-of-custody forms and shipment of samples to the laboratory, and liaising with the laboratory and the WTC as required.
- The Environmental Technician or designate will participate in the field program, data management and entry, preparation and shipment of samples to the laboratory and other tasks as required on the direction of the Environmental Scientist. On-the-job training will be provided to carry out the responsibilities under this monitoring program.

A Wildlife Biologist will provide technical support for the monitoring program as needed. In addition to providing training related to the field program, the biologist may participate in the field program, program review (e.g., field methods, data collection and management, etc.), and data analysis and reporting as required.

Training will be provided in the field to ensure that data is collected in a consistent and accurate manner, and to ensure calibration among all personnel involved in the field program.

FIELD EQUIPMENT AND SUPPLIES

Equipment and supplies that will be needed to complete the field program includes:

- Binoculars and/or spotting scope
- Field identification guidebooks
- Datasheets and clipboard
- Waterproof markers and pencils
- Field maps
- Hip or chest waders and boots
- Handheld GPS

⁴ Resource Inventory Committee (RIC). 1997. Standardized Inventory Methods for Components of British Columbia's Biodiversity: Shorebirds *Plovers, Oystercatchers, Stilts, Avocets, Sandpipers, Phalaropes and Allies* (v.1.1). BC Ministry of Environment, Lands, and Parks, Victoria, BC.

⁵ Resource Inventory Committee (RIC). 1999. Inventory Methods for Waterfowl and Allied Species: *Loons, Grebes, Swans, Geese, Ducks, American Coot and Sandhill Crane* (v. 2.0). Standards for Component's of British Columbia's Biodiversity No. 18. BC Ministry of Environment, Lands, and Parks, Victoria, BC.

- Flagging tape
- Safety and first aid gear
- Stakes or t-bar fence posts
- Permanent station makers (e.g., metal tags)
- Digital camera

PROGRAM PLANNING AND LOGISTICS

Prior to the start of the field program, research permits will need to be acquired, field equipment and supplies obtained, and wetland delineation and areas determined. Following the completion of the field program, an Export Permit for shipment of samples to a laboratory in British Columbia must be obtained.

The research permitting process will be led by the Environmental Scientist. Prior to initiating the monitoring studies, a *Scientists and Explorers Permit* under the *Yukon Scientists and Explorers Act (1958)* from the Yukon Tourism and Culture, Heritage Resources Branch, and a *Wildlife Research Permit* under the *Yukon Wildlife Act* from the Yukon Environment will be obtained.

The process for applying for the research permits requires the completion of the *Scientists and Explorers License Application* available at http://www.tc.gov.yk.ca/scientists_explorers.html. The application process may take up to three months due to the consultative component of the permit application process.

After the *Scientists and Explorers Permit* is received, the application process for the *Wildlife Research Permit* can proceed. Information, including a description of the planned research or monitoring studies, and copies of the *Scientists and Explorers* permit is provided to the Yukon Environment, Enforcement and Compliance Branch, for review. The *Wildlife Research Permit* is then issued after completion of the review. This process typically takes about a week to complete.

FIELD METHODS

1. Control Site and Observation Station Verification

Field verification of control areas (Figure 2) will be carried out in summer 2009 to ensure that they are suitable for meeting the objectives of this program. This will involve:

- Visiting control areas to evaluate whether they are suitable for this program.
- Selecting observation station locations within each survey area, and establishing adequate stations so that the entire area can be viewed.
- Marking and installing signage (or permanent markers) at each station location, and recording the location (in UTM's) using a handheld GPS. Data collected for each observation station will be recorded on the *Tailings Facility Monitoring Station Datasheet*.
- Recording wetland/habitat characteristics and evidence of wildlife sign at each observation station at the beginning of each survey period (i.e., spring and fall migration periods).
- Flagging the route between observation stations to ease locating during subsequent visits.

Prior to the survey periods each year, the survey areas will be visited to ensure that the stations are well marked.

2. Field Survey Methods

To minimize potential disturbance to wildlife and wildlife habitat from monitoring activities, the guidelines provided in Appendix B of the *Wolverine Project Wildlife Protection Plan v. 2009-01* will be followed. Field survey will be carried out according to the methods outlined below.

- Surveys will not be carried out if weather conditions that reduce visibility (e.g., rain, high winds, fog, etc.) are present.
- Each survey area (i.e., tailings facility, or control areas) will be surveyed at minimum once per week during the survey period (i.e., spring or fall migration).
- Surveys will be initiated about a half an hour after sunrise and be completed within four hours after sunrise. More than morning survey session may be needed to survey the three survey areas.
- The order in which the survey areas are visited will be rotated between surveys. The first monitoring period will start in fall 2009 for the control sites only. The tailings facility study area will be monitored after it has been constructed, and the operations phase has been initiated.
- During a given survey period (i.e., spring or fall migration monitoring period), efforts will be made to ensure that they survey areas are surveyed the same observer.
- The observer will be careful not to disturb birds when approaching observation stations, and will wait at each observation station for at least one minute before stating the survey.
- From the observation station, birds will be sighted using binoculars and/or spotting scope as required. Sighting distance should be about 100 m from the observation station.
- All waterfowl and shorebirds seen from the observation station will be counted by species, and age and sex class, if possible. Each cluster of birds will be counted at least three times to ensure accuracy. The highest value will be recorded if there is a discrepancy between counts. Data will be recorded on the *Tailings Facility Monitoring Survey Datasheet*.
- Evidence of other wildlife use (e.g., beaver, bear, moose) will also be recorded.
- The Environmental Scientist or designate will ensure that all datasheets are complete and accurate before proceeding to the next station.

DATA MANAGEMENT

The Environmental Scientist will be responsible for ensuring that datasheets are complete and accurate, samples are packaged, labeled and stored correctly, and data management and entry procedures are accurate and complete.

All original hardcopy data and supplementary information (e.g., photographs) will be scanned and stored in an electronic format on the project network. All original hardcopy data (e.g., datasheets,

maps, etc) will be filed according to standard procedures to ensure that the integrity of the data is maintained and thoroughly documented in the project files.

All monitoring data and supplementary information will be entered into an electronic database such as MS Excel or MS Access according to standard procedures. All data entered into the database will be rechecked by the person entering the data to ensure that it is correct. Discrepancies between field data and database will be identified and corrected. The Environmental Coordinator or designate will carry out quality control measures at the end of each data entry cycle.

Review of the monitoring program data will be carried out by a YZC Environmental Scientist or Wildlife Biologist to assess whether there are any immediate wildlife issues or concerns that need to be addressed, or if there are any trends associated with project components or operations that require follow-up actions.

DATA ANALYSIS AND REPORTING

Routine analysis and reporting of monitoring program results is a fundamental component of the adaptive management process. At the conclusion of the monitoring program and receipt of metal analyses, in years that the program is undertaken, a summary report will be prepared by YZC. The report will include the monitoring procedures, data results and analyses, and appendices with the original field and laboratory data. The purpose of the summary report will be to provide a detailed record of monitoring program results, a tool for monitoring impacts to wildlife and their habitats, and to facilitate detailed review by the WTC. The report will subsequently be included in the Wolverine Project Annual Report as required by *QML-0006*.

DATASHEETS

The datasheet that will be used for this program is provided below. The datasheet will be reviewed and modified as required based on the results of the initial monitoring program.

1. Tailings Facility Monitoring Station Datasheet
2. Tailings Facility Monitoring Survey Datasheet



**WOLVERINE PROJECT
TAILINGS FACILITY MONITORING STATION DATASHEET**

Field Crew: _____ Date: _____ Time (24 hour): _____ Survey Area: _____ Wetland Size (ha): _____

Stn. No.	Location		Station Vegetation Characteristics ¹								Comments (e.g., evidence of wildlife use, wetland characteristics, etc)
			Tree Layer		Shrub Layer		Forb Layer		Ground Layer		
	Easting	Northing	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	

¹ Station Vegetation Characteristics: Provide for each layer - % cover by layer (i.e., tree, shrub, forb, ground), and the dominant species in each vegetation layer

Appendix E: Winter Wildlife Monitoring Protocol

PURPOSE

The purpose of this program is to monitor the occurrence, distribution and movement of wildlife in the winter months, and assess if effects are occurring from mine activities.

FOCAL SPECIES

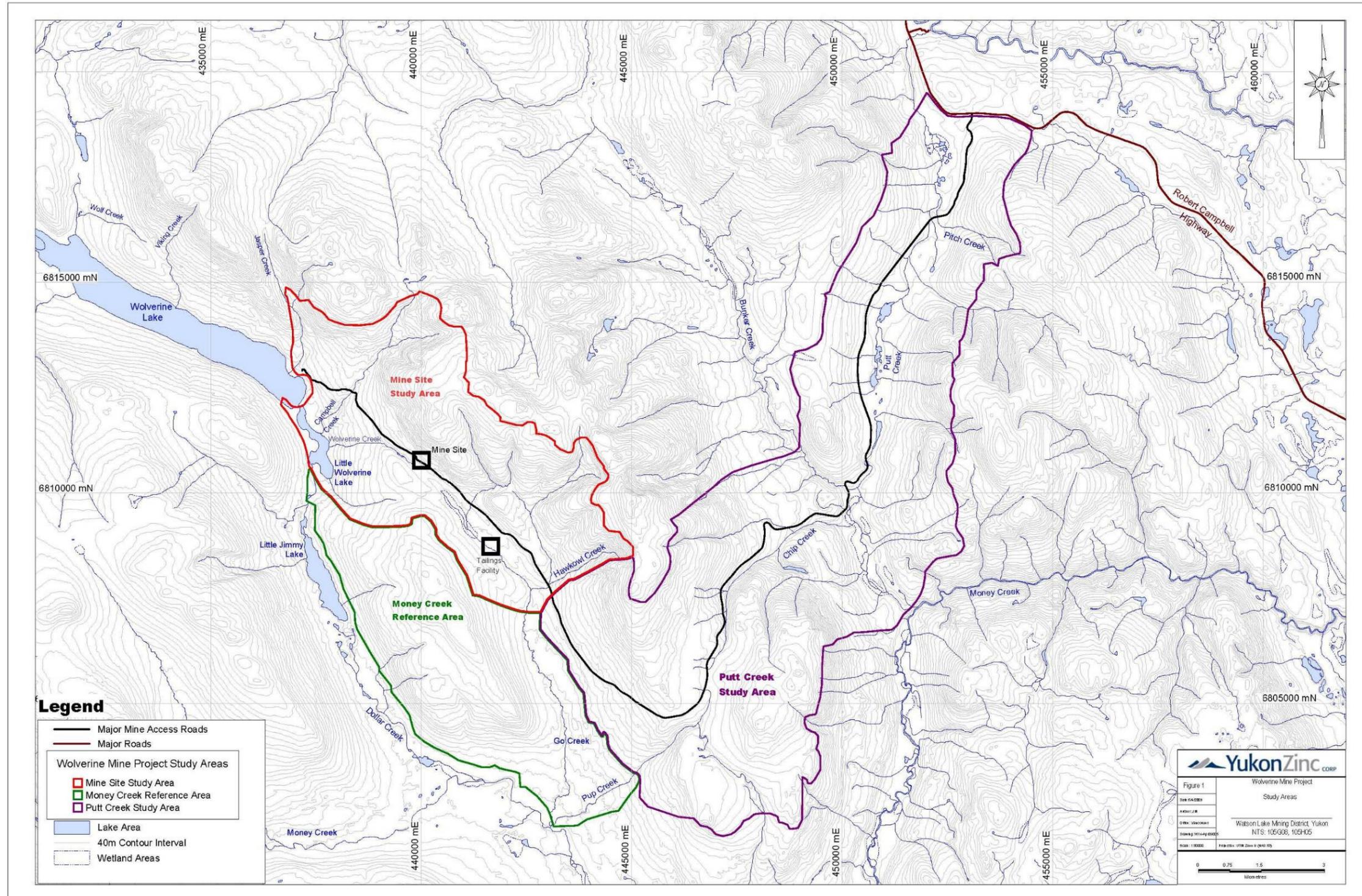
The winter wildlife monitoring program focuses primarily on terrestrial wildlife active during the winter months. Species that may occur in the vicinity of the Wolverine Project include lynx (*Lynx canadensis*), wolf (*Canis lupus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), wolverine (*Gulo gulo*), fisher (*Martes pennanti*), marten (*Martes americana*), moose (*Alces alces*), and caribou (*Rangifer tarandus*). This method is not suitable for surveying hibernating species.

STUDY AREA

The study areas for the baseline and effects monitoring are the Mine Site Study Area (MSSA) and the Putt Creek Study Area (PCSA). These study areas roughly correspond to the wildlife local study area that was assessed during the Environmental Assessment (EA) phase of the Wolverine Project (YZC, 2005)¹. The MSSA is about 3,240 ha, and includes the mine site infrastructure (i.e., mine portal, tailings facility, camp complex, industrial complex, airstrip and landfill). The PCSA is about 7,920 ha, and includes the the access road from the mine site to its junction with the Robert Campbell Highway. The control/reference area included in the program is the Money Creek Reference Area (MCRA). The MCRA is about 2,560 ha and is situated in the Money Creek watershed, and is similar in ecosystem composition to the MSSA and PCSA. The study areas for the monitoring program are shown on Figure 1.

During the EA phase of the Project, the wildlife study area was stratified into four bioclimate zones: alpine (ALP), subalpine (SUB), boreal highland (BOH) and boreal lowland (BOL; YZC, 2005). The ALP zone is found above 1,650 m above sea level (a.s.l.), primarily to the north of the mine infrastructure and airstrip. It is characterized by gently rolling high elevation topography, and is dominated by lichens, sedges, fescue, and alpine forbs. The SUB zone is found between 1,320 to 1,650 m a.s.l., and is comprised of scrub birch and forb meadow complexes in low relief areas, with dwarf shrubs such as heathers and avens at upper elevations. This zone covers a large area north of Go Creek and encompasses most of the western portion of the assessed area. BOH is the most common bioclimate zone in the study area, and is found at elevations from 980 to 1,320 m a.s.l. This zone is dominated by black and white spruce in forested areas with willow/birch mosaics along gentle side slopes, and a number of wetlands in valley bottoms. BOL is found only in the PCSA near the access road and Robert Campbell Highway junction at elevations below 980 m a.s.l. It is characterized by a relatively high cover of lodgepole pine and white spruce forest with varied amounts of aspen and pine on crests and south-facing slopes. Black spruce dominates valley bottoms adjacent to wetlands. Bioclimate zone distribution relative to the study areas are shown on Figure 2.

¹ Yukon Zinc Corporation (YZC). 2005. Wolverine Project Environmental Assessment Report, October 2005. Prepared by AXYS Environmental Consulting Ltd.



STUDY DESIGN

Winter track count surveys will be carried out each winter season during the construction and operations phases, and will coincide with other routine monitoring activities post-closure. As per RIC (1998², 1999³) approximately 20 km of transect will be established in the study areas. It is expected that about half of the transects will be associated with project components (e.g., mine site and access road), and the remaining transects in undisturbed and/or control areas. Where possible, transects will be established within only one bioclimate zone. Transect locations are shown on Figure 3 and will be field verified during summer 2009.

Transects will be systematically surveyed using standard winter track count methods as described by RIC (1998, 1999, 2006⁴) and Hofer (2007)⁵. Field surveys will involve documenting wildlife or wildlife sign (e.g., tracks, scat, and pellets) that cross or intercept each transect. Data collection will include documenting species, type of sign, distance along transect sign encountered, and general habitat information. Snow depth data will also be collected at regular intervals along each transect according to D'Eon (2004)⁶ and RIC (2006). The field methods for this program are outlined below. Surveys will occur from about mid October through to late April, and will be dependent on winter weather and snow conditions. The surveys will be completed at minimum once per month, with about seven survey sessions being conducted each winter season. Additional surveys will be carried out if winter weather and snow conditions permit.

PERSONNEL AND TRAINING

A field crew comprised of two people (i.e., Environmental Scientist and Environmental Technician or designates) will be required to complete the work under this monitoring program. The responsibilities of each person are outlined below.

- A YZC Environmental Scientist or designate will be responsible for ensuring that the monitoring program is conducted according to current standards and practices. In addition to participating in the field program as required, the Scientist will carry out quality control measures to ensure data is complete and accurate, oversee data management and entry, and ensure proper processing of samples, completion of chain-of-custody forms and shipment of samples to the laboratory, and liaising with the laboratory and the WTC as required.
- The Environmental Technician or designate will participate in the field program, data management and entry, preparation and shipment of samples to the laboratory and other tasks as required on the direction of the Environmental Scientist. On-the-job training will be provided to carry out the responsibilities under this monitoring program.

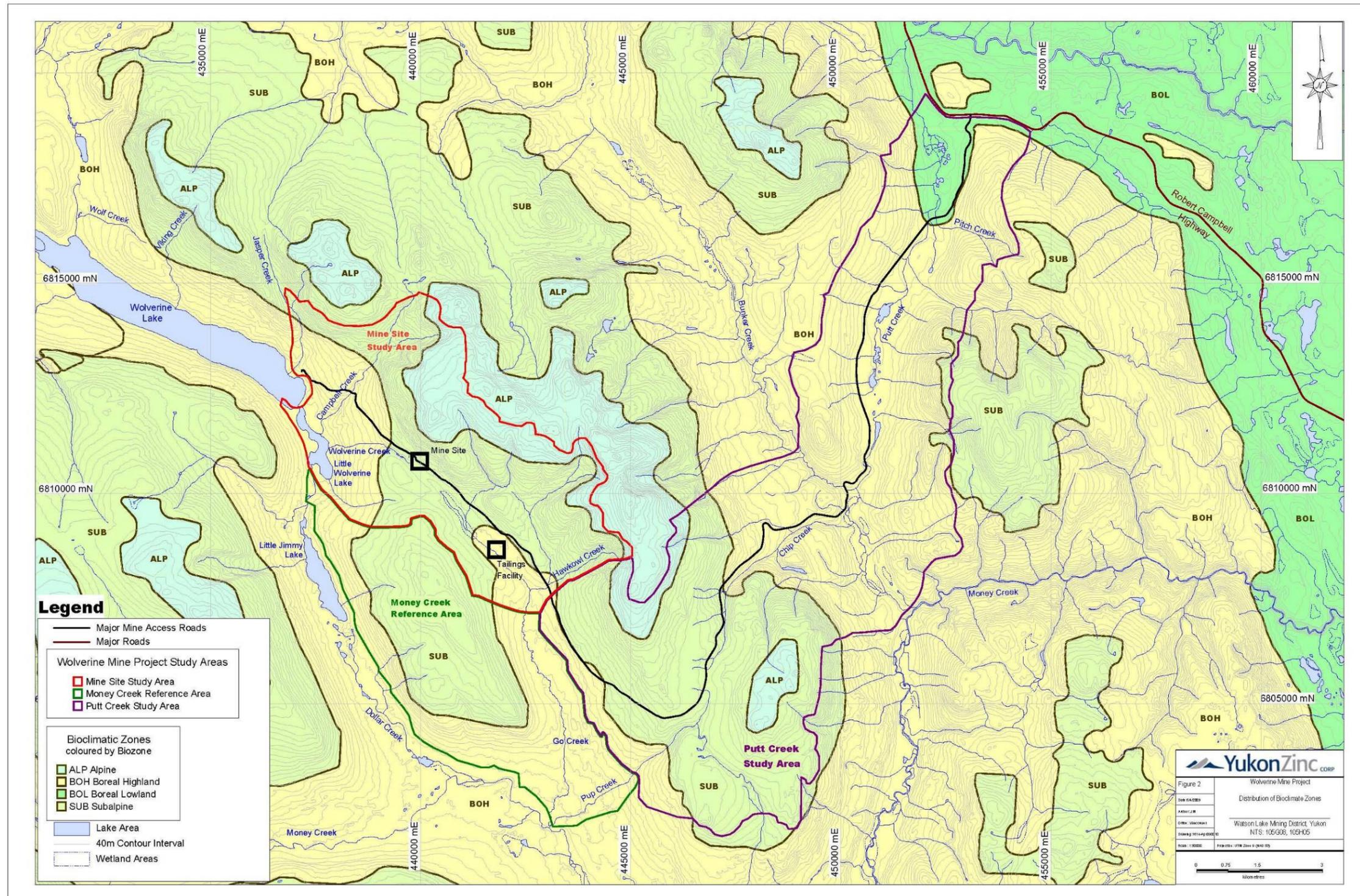
² Resource Inventory Committee (RIC). 1998. Inventory Methods for Marten and Weasels. Standards for Components of British Columbia's Biodiversity No. 24. BC Ministry of Environment, Lands and Parks, Victoria, BC.

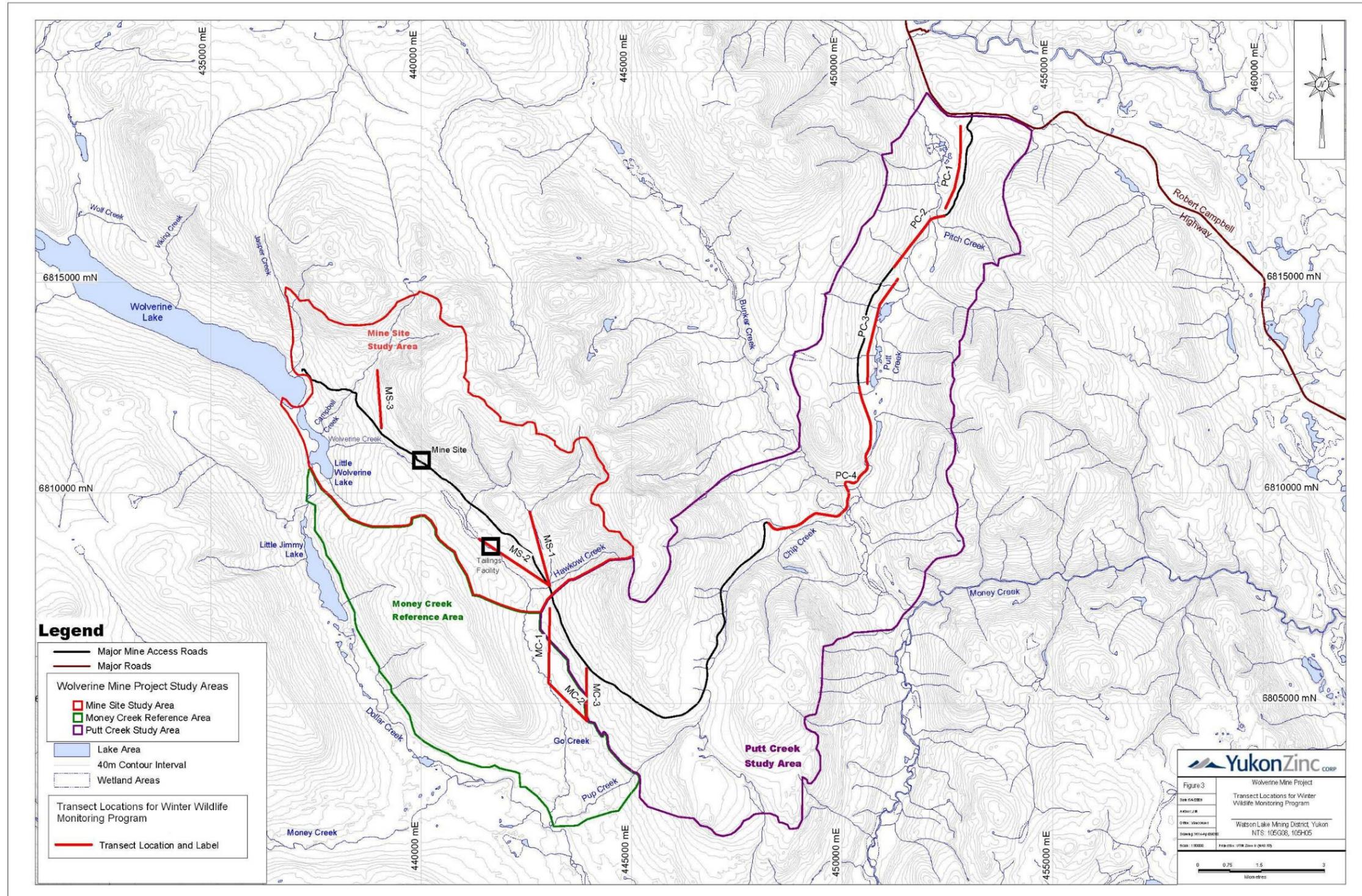
³ Resource Inventory Committee (RIC). 1999c. Inventory Methods for Medium-sized Territorial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher, and Badger. Standards for Components of British Columbia's Biodiversity No. 25. Prepared by the Ministry of Environment, Lands and Parks, Victoria, BC.

⁴ Resource Inventory Committee (RIC). 2006. Ground-based Inventory Methods for Ungulate Snow-track Surveys. Standards for Components of British Columbia's Biodiversity No. 33a. BC Ministry of Environment, Victoria, BC.

⁵ Hofer, E. 2007. Yukon Ecological Monitoring Protocols (2007 ed.). Kluane Monitoring Handbook. Available at: <http://www.zoology.ubc.ca/~krebs/kluane.html>. Accessed on January 5, 2009.

⁶ D'Eon, R.G. 2004. Snow Depths as a Function of Canopy Cover and Other Site Attributes in a Forested Ungulate Winter Range in Southeast British Columbia. BC Journal of Ecosystems and Management, 3(2): 1-9.





A Wildlife Biologist will provide technical support for the monitoring program as needed. In addition to providing training related to the field program, the biologist may participate in the field program, program review (e.g., field methods, data collection and management, etc.), and data analysis and reporting as required.

Training will be provided in the field to ensure that data is collected in a consistent and accurate manner, and to ensure calibration among all personnel involved in the field program.

FIELD EQUIPMENT AND SUPPLIES

Equipment and supplies that will be needed to complete the field program includes:

- Snowmobiles or vehicle
- Handheld GPS
- Flagging tape
- Field maps
- Clipboard and datasheets (printed on waterproof paper)
- Snowshoes or skis
- T-bar fence posts or stakes
- Graduated snow probe (for measuring snow depth)
- Wildlife field guidebooks
- Digital camera
- Erasable writing tablet
- Ruler (e.g., clear plastic)
- Waterproof markers and pencils
- Backpack
- Safety (e.g., handheld radio, bear spray, bear bangers) and first aid gear

PROGRAM PLANNING AND LOGISTICS

Prior to the start of the field program, research permits will need to be acquired, field equipment and supplies obtained, and transects need to be field verified. Following the completion of the field program, an Export Permit for shipment of samples to a laboratory in British Columbia must be obtained.

The research permitting process will be led by the Environmental Scientist. Prior to initiating the monitoring studies, a *Scientists and Explorers Permit* under the *Yukon Scientists and Explorers Act (1958)* from the Yukon Tourism and Culture, Heritage Resources Branch, and a *Wildlife Research Permit* under the *Yukon Wildlife Act* from the Yukon Environment will be obtained.

The process for applying for the research permits requires the completion of the *Scientists and Explorers License Application* available at http://www.tc.gov.yk.ca/scientists_explorers.html. The application process may take up to three months due to the consultative component of the permit application process.

After the *Scientists and Explorers Permit* is received, the application process for the *Wildlife Research Permit* can proceed. Information, including a description of the planned research or monitoring studies, and copies of the *Scientists and Explorers* permit is provided to the Yukon Environment, Enforcement and Compliance Branch, for review. The *Wildlife Research Permit* is then issued after completion of the review. This process typically takes about a week to complete.

FIELD METHODS

1. Transect Field Verification

- The point of commencement (POC) for each transect will be located in the field, and marked using a tree or stake, flagged, and labeled. The stake and/or flagging will be placed as high as possible so that the POC isn't buried under snow in winter.
- The POC will be labeled with transect ID, bearing, and distance along transect (e.g., Transect MS-1 180° 0+000 m)
- The location will be referenced using a handheld GPS and photographed. Data for each transect will be recorded on the *Winter Wildlife Monitoring Transect Datasheet*.
- The transect bearing will be followed, preferably in a straight line, and flagged. The distance will be measured using handheld GPS (or compass and hip-chain if preferred).
- The point of termination (POT) will be marked, labeled and photographed. Data on transect length and location will be recorded on the datasheet.

Prior to each winter monitoring period, the field team will confirm that transects are clearly marked and labeled in the summer. Missing markers, in particular POC and POT markers, will be replaced as required.

2. Field Survey Methods

To minimize potential disturbance to wildlife and habitat from monitoring activities, the guidelines provided in Appendix B of the *Wolverine Project Wildlife Protection Plan v. 2009-01* or subsequent updates will be followed. Field surveys will be conducted according to the following procedures:

- Survey will be initiated at least 12 hours after a snowfall.
- General information will be recorded at the beginning of the survey, including transect ID, date, start time, weather conditions the day before and day of the count, and time since last snowfall. All data will be recorded on the *Winter Wildlife Monitoring Survey Datasheet*.
- Transects will be surveyed using snowmobiles, vehicles, snowshoes and/or skis as necessary. Snowmobile or vehicle travel speed will be no more than 5 km/h to avoid missing or running over tracks.
- The field crew will track bearing and distance along transect using a snowmobile/vehicle odometer, hip-chain or handheld GPS.
- Any wildlife species or sign that crosses or intercepts the transect will be counted. Data recorded for each observation will include wildlife species, sign type (e.g., track, trail, scat/pellets, den, etc), distance species/sign found along transect, and general habitat data.
- After a track or trail has been counted, it will be crossed out to avoid recounting during subsequent surveys.
- Snow depth measurements (in centimeters (cm) and recorded to the nearest 0.5 cm) will be taken every 500 m using a snow probe (i.e., a graduated pole for measuring snow depth),

and also at the POC and POT of each transect. Three measurements will be taken and averaged.

- When possible, photographs including sign, habitat, or wildlife will be taken.
- Before leaving the site, datasheet(s) will be checked to ensure that all fields have been entered completely (i.e., no missing data) and accurately.

DATA MANAGEMENT

The Environmental Scientist will be responsible for ensuring that datasheets are complete and accurate, samples are packaged, labeled and stored correctly, and data management and entry procedures are accurate and complete.

All original hardcopy data and supplementary information (e.g., photographs) will be scanned and stored in an electronic format on the project network. All original hardcopy data (e.g., datasheets, maps, etc) will be filed according to standard procedures to ensure that the integrity of the data is maintained and thoroughly documented in the project files.

All monitoring data and supplementary information will be entered into an electronic database such as MS Excel or MS Access according to standard procedures. All data entered into the database will be rechecked by the person entering the data to ensure that it is correct. Discrepancies between field data and database will be identified and corrected. The Environmental Coordinator or designate will carry out quality control measures at the end of each data entry cycle.

Review of the monitoring program data will be carried out by a YZC Environmental Scientist or Wildlife Biologist to assess whether there are any immediate wildlife issues or concerns that need to be addressed, or if there are any trends associated with project components or operations that require follow-up actions.

DATA ANALYSIS AND REPORTING

Routine analysis and reporting of monitoring program results is a fundamental component of the adaptive management process. At the conclusion of the monitoring program and receipt of metal analyses, in years that the program is undertaken, a summary report will be prepared by YZC. The report will include the monitoring procedures, data results and analyses, , and appendices with the original field and laboratory data. The purpose of the summary report will be to provide a detailed record of monitoring program results, a tool for monitoring impacts to wildlife and their habitats, and to facilitate detailed review by the WTC. The report will subsequently be included in the Wolverine Project Annual Report as required by *QML-0006*.

DATASHEETS

The datasheet that will be used for this program is provided below. The datasheet will be reviewed and modified as required based on the results of the initial monitoring program.

1. Winter Wildlife Monitoring Transect Datasheet
2. Winter Wildlife Monitoring Survey Datasheet



**WOLVERINE PROJECT
WINTER WILDLIFE MONITORING TRANSECT DATASHEET**

Date: _____ Field Crew: _____ Weather: _____

Transect ID	Survey Area ¹	Transect Bearing (°)	Point of Commencement		Transect Length (m)	Point of Termination		General Comments (e.g., photos, habitat, sign)
			UTM Easting	UTM Northing		UTM Easting	UTM Northing	

¹ Survey areas: Mine Site Study Area (MSSA), Putt Creek Study Area (PCSA), or Money Creek Reference Area (MCRA)

Instructions for completing the datasheet are provided below.

The information provided below is specific to the Track Survey Data portion of the datasheet.

1. Distance: record the distance sign was encountered along the transect.
2. Species code: for mammals are based, in general, on the first two letters in the genus and species. Species codes for animals that some species that may be encountered during the program are provided in Table 1. It is possible other species that are not in this list may also be encountered during survey, and should be added to the list.

Table 1. Wildlife Species Names and Codes

Common Name	Scientific Name	Species Code
Lynx	<i>Lynx canadensis</i>	LYCA
Coyote	<i>Canis latrans</i>	CALA
Wolf	<i>Canis lupus</i>	CALU
Fox	<i>Vulpes vulpes</i>	VUVU
Wolverine	<i>Gulo gulo</i>	GUGU
Fisher	<i>Martes pennanti</i>	MAPE
Marten	<i>Martes americana</i>	MAAM
Moose	<i>Alces alces</i>	ALAL
Caribou	<i>Rangifer tarandus</i>	RATA

3. Sign Type: The most likely sign types that will be encountered include visual observations of animals (V), scat (SC), pellets (P), tracks (TR), trail (TL), digging (DG), hair (H), bed (B), den (D), mineral lick (ML). If other sign is seen and is not included then be sure to record the new code and its definition on the datasheet.
4. Number of Sign: refers to the number of a type of sign seen. For example, a linear set of tracks are typically considered a trail, or the number of animal seen, sets of tracks, piles of scat, beds, etc.
5. Habitat: record the general habitat characteristics in the vicinity of where wildlife or wildlife sign were encountered. For example, were there any unique habitat features (e.g., coarse woody debris, wildlife trees, dense forest stand) or provide a general description of the structural characteristics.

The information provided below applies to the Snow Depth Data portion of the datasheet.

1. Distance: refers to the distance along the transect that snow depth data was measured and recorded.
2. Snow Depth (cm): refers to the snow depth measurements taken at each location. Three measurements of snow depth will be taken at a distance of about 1 m from each other. Measurements will be recorded to the nearest 0.5 cm.
3. Average Snow Depth (cm): The three snow depth measurements will be averaged to obtain this value. This measurement can be calculated at the mine site office after returning from the field.
4. Comments: provide any general comments on snow conditions that may affect the survey.

Appendix F Metal Levels in Vegetation Protocol



WOLVERINE PROJECT ROUTINE MONITORING: METAL LEVELS IN VEGETATION PROTOCOL

PURPOSE

The purpose of this program is to assess baseline metal concentrations in wildlife forage plants, and determine whether metal levels in the selected vegetation species increase from mine operation.

FOCAL SPECIES

Three plant life forms were selected for sampling based on their value as wildlife forage plants, variability in mechanisms for metals uptake, rate of metals accumulation, and differences in exposure pathways. These include lichen (*Cladina stellaris*), willow (*Salix planifolia*), and horsetail (*Equisetum arvense*). Lichens have been widely used in other studies as indicators of environmental quality, primarily associated with contamination from atmospheric sources and precipitation (Gartner Lee, 2006¹; Hutchinson et al., 1996²), and are important forage resources for woodland caribou using habitats in the region. Willow is an important forage resource for moose throughout most of the year, and is also browsed by caribou (Franzmann and Schwartz, 2007)³. Horsetail is a preferred forage species of moose and bears using riparian and wetland habitats (Schwartz et al., 2003)⁴.

STUDY AREAS

The study areas for the baseline and effects monitoring are the Mine Site Study Area (MSSA) and the Putt Creek Study Area (PCSA). These study areas roughly correspond to the wildlife local study area that was assessed during the Environmental Assessment (EA) phase of the Wolverine Project (YZC, 2005)⁵. The MSSA is about 3,240 ha, and includes the mine site infrastructure (i.e., mine portal, tailings facility, camp complex, industrial complex, airstrip and landfill). The PCSA is about 7,920 ha, and includes the the access road from the mine site to its junction with the Robert Campbell Highway. The control/reference area included in the program is the Money Creek Reference Area (MCRA). The MCRA is about 2,560 ha and is situated in the Money Creek watershed, and is similar in ecosystem composition to the MSSA and PCSA. The study areas for the monitoring program are shown on Figure 1.

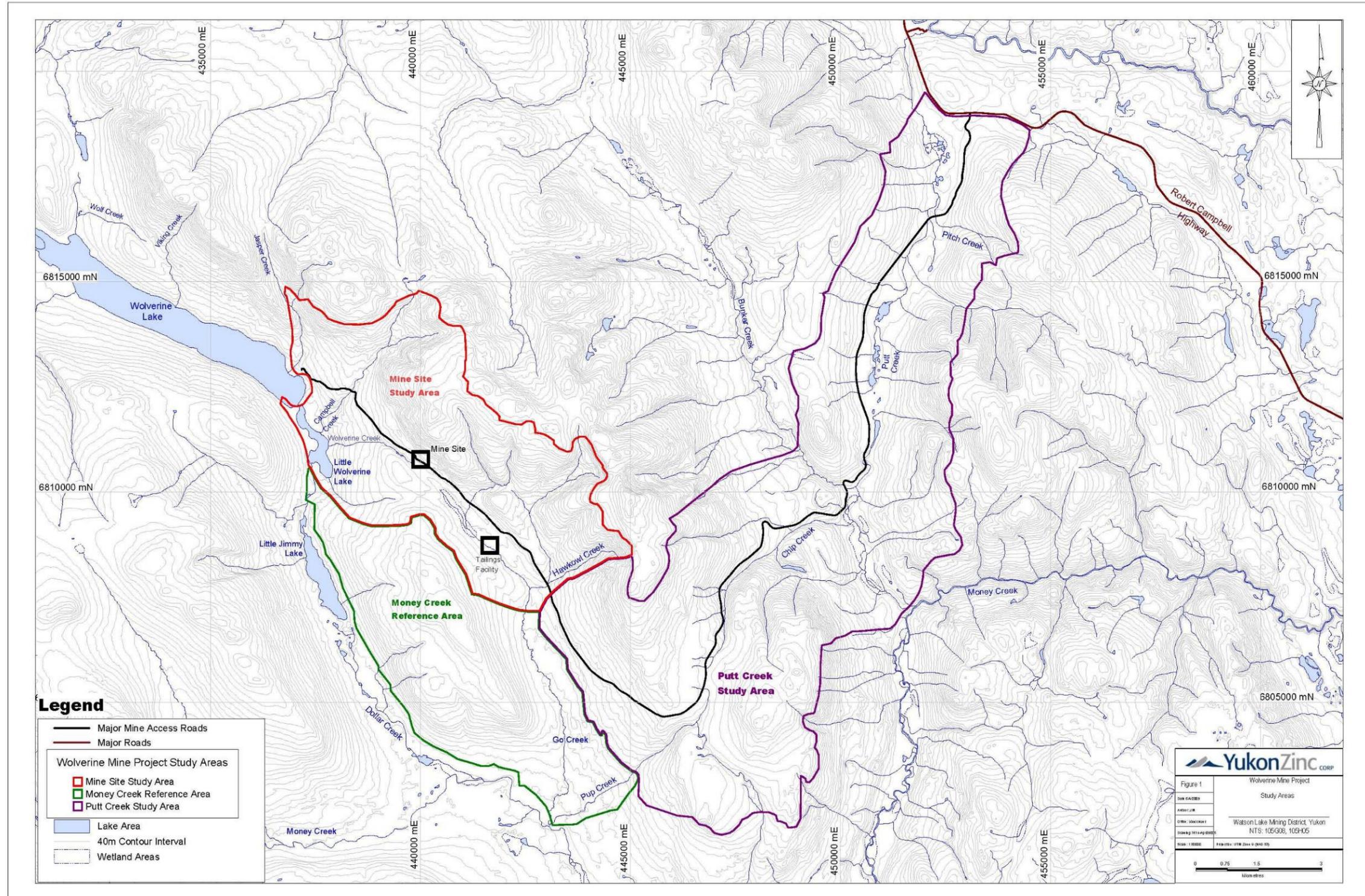
¹ Gartner Lee Ltd. 2006. Anvil Range Mine Complex – Terrestrial Effects Study: Investigation into Metal Concentrations in Vegetation, Wildlife and Soils. Prepared for Deloitte & Touche on behalf of the Faro Mine Closure Planning Office.

² Hutchinson, J., Maynard, D., and Geiser, L. 1996. Air Quality and Lichens – A Literature Review Emphasizing the Pacific Northwest, USA. USDA Forest Service, Pacific Northwest Region Air Resource Management Program.

³ Franzmann, A.W., and C.C. Schwartz. 2007. Ecology and management of the North American moose 2nd ed. University Press of Colorado, Boulder, CO.

⁴ Schwartz, C.C., Miller, S.D., and M.A. Haroldson. 2003. Grizzly Bear. In G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, eds. Wildlife Mammals of North America: Biology, Management, and Conservation. 2nd Ed. Johns Hopkins University Press, Baltimore, Maryland. p. 556-586.

⁵ Yukon Zinc Corporation (YZC). 2005. Wolverine Project Environmental Assessment Report, October 2005. Prepared by AXYS Environmental Consulting Ltd.



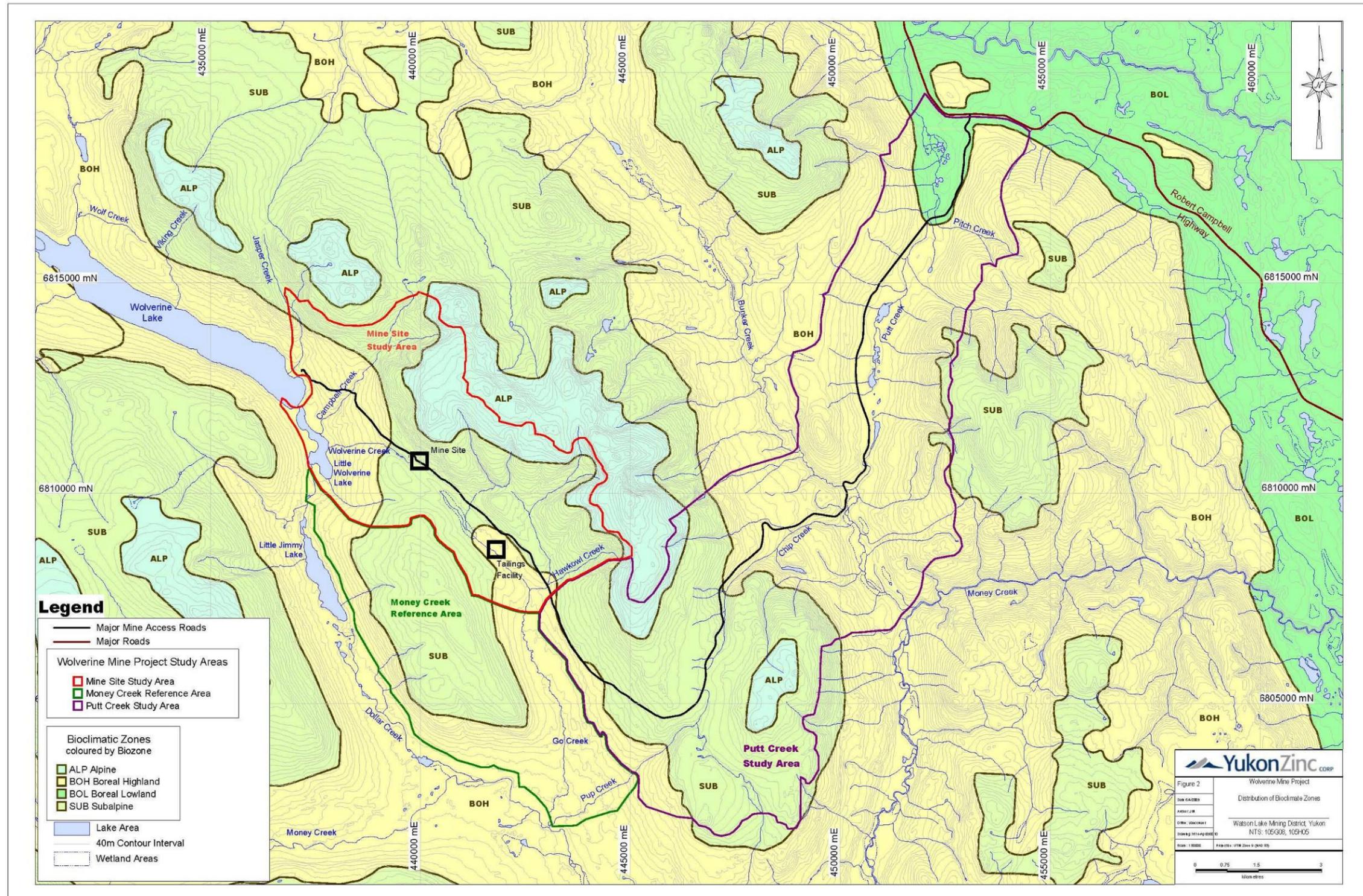
During the EA phase of the Project, the wildlife study area was stratified into four bioclimate zones: alpine (ALP), subalpine (SUB), boreal highland (BOH) and boreal lowland (BOL; YZC, 2005). The ALP zone is found above 1,650 m above sea level (a.s.l.), primarily to the north of the mine infrastructure and airstrip. It is characterized by gently rolling high elevation topography, and is dominated by lichens, sedges, fescue, and alpine forbs. The SUB zone is found between 1,320 to 1,650 m a.s.l., and is comprised of scrub birch and forb meadow complexes in low relief areas, with dwarf shrubs such as heathers and avens at upper elevations. This zone covers a large area north of Go Creek and encompasses most of the western portion of the assessed area. BOH is the most common bioclimate zone in the study area, and is found at elevations from 980 to 1,320 m a.s.l. This zone is dominated by black and white spruce in forested areas with willow/birch mosaics along gentle side slopes, and a number of wetlands in valley bottoms. BOL is found only in the PCSA near the access road and Robert Campbell Highway junction at elevations below 980 m a.s.l. It is characterized by a relatively high cover of lodgepole pine and white spruce forest with varied amounts of aspen and pine on crests and south-facing slopes. Black spruce dominates valley bottoms adjacent to wetlands. Bioclimate zone distribution relative to the study areas are shown on Figure 2.

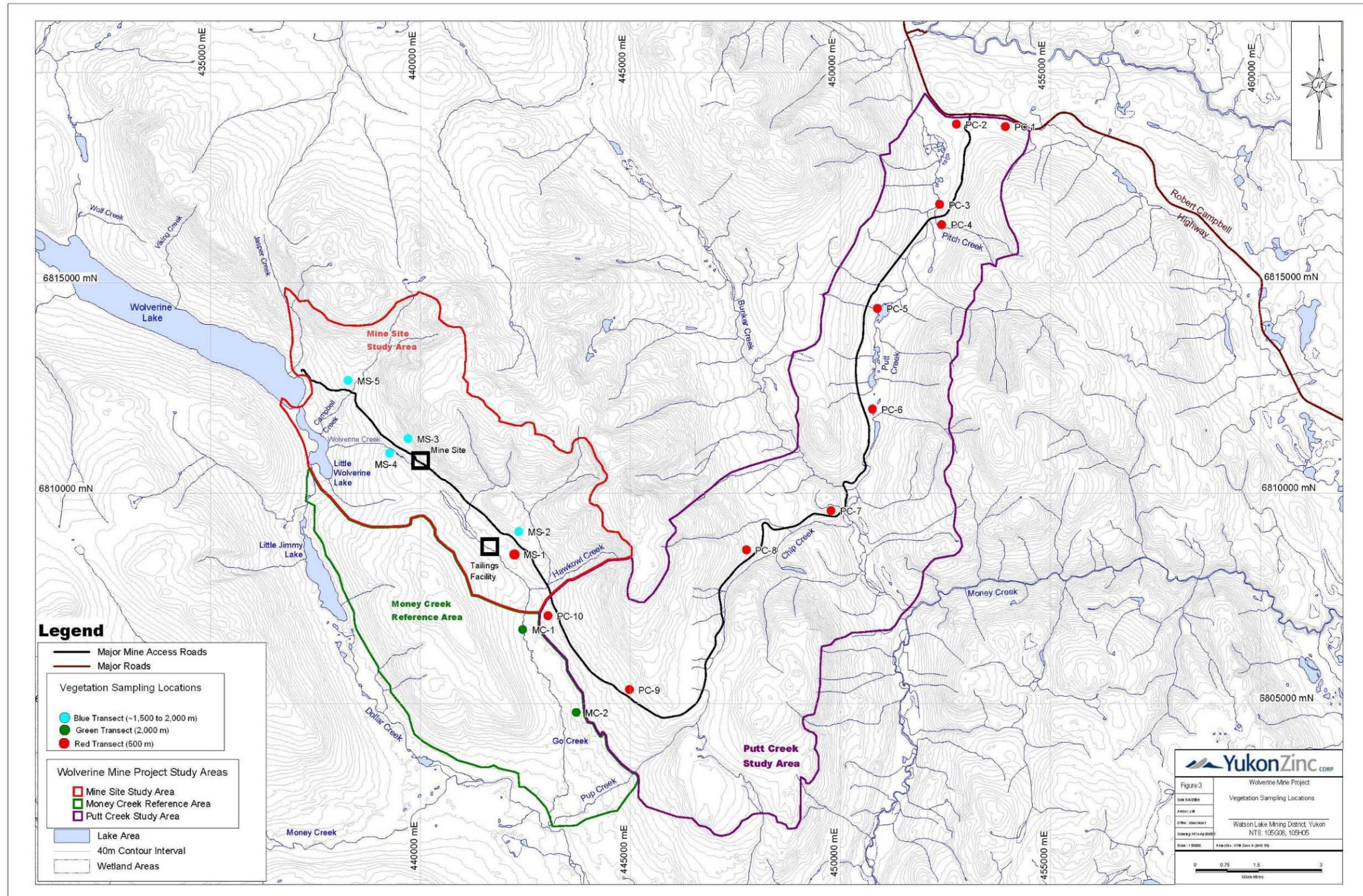
STUDY DESIGN

Baseline sampling for metal levels in wildlife forage plants will occur in 2009, and subsequent operational monitoring will commence in 2011 and then every three years (e.g., 2014, 2017) thereafter until closure, or until monitoring data indicates no contamination and the Wildlife Technical Committee (WTC) is in agreement. The sampling of vegetation will occur in late July and early August during the peak growing season.

Five transects, approximately 1,500 to 2,000 m in length, will be established in the MSSA. The length of each transect will be modified as required and will be dependent on terrain and accessibility to areas for sampling. Each transect will originate in the vicinity of the mine site and radiate out into surrounding areas. Vegetation samples will be collected every 250 m between 0 m and 1,000 m, and every 500 m thereafter along each transect, corresponding to about seven stations along each transect. In the PCSA, 10 sampling sites will be located along the length of the access road. A 500 m transect will be established at each location with vegetation samples being collected at 0 and 500 m. The start of each transect will be a minimum of 50 m off the road corridor. Two 2,000 m transects will be established in the MCRA. Sampling along each transect will occur every 500 m, totaling ten sampling stations. Sampling transects and site locations are shown on Figure 3, and will be field verified in summer 2009.

All reasonable efforts will be made to ensure that each transect is located within only one bioclimate zone. Vegetation samples will be collected at regular intervals along each transect. For each species present at a sampling location, three replicate (triplicate) samples will be collected. The goal will be to collect about 35 lichen, 50 willow, and 50 horsetail triplicates across all study areas combined. Samples will be collected using powder-free nitrile gloves, and placed in a labeled sterile plastic bag. Data that will be recorded for each sample collected is outlined in the Field Methods below. Digital photographs will be taken of each sampling station for program records. All vegetation samples will be frozen until shipment to an accredited laboratory of metals analysis using ICP-MS.





PERSONNEL AND TRAINING

A field crew comprised of two people (i.e., Environmental Scientist and Environmental Technician or designates) will be required to complete the work under this monitoring program. The responsibilities of each person are outlined below.

- A YZC Environmental Scientist or designate will be responsible for ensuring that the monitoring program is conducted according to current standards and practices. In addition to participating in the field program as required, the Scientist will carry out quality control measures to ensure data is complete and accurate, oversee data management and entry, and ensure proper processing of samples, completion of chain-of-custody forms and shipment of samples to the laboratory, and liaising with the laboratory and the WTC as required.
- The Environmental Technician or designate will participate in the field program, data management and entry, preparation and shipment of samples to the laboratory and other tasks as required on the direction of the Environmental Scientist. On-the-job training will be provided to carry out the responsibilities under this monitoring program.

A Wildlife Biologist will provide technical support for the monitoring program as needed. In addition to providing training related to the field program, the biologist may participate in the field program, program review (e.g., field methods, data collection and management, etc.), and data analysis and reporting as required.

Training will be provided in the field to ensure that data is collected in a consistent and accurate manner, and to ensure calibration among all personnel involved in the field program.

FIELD EQUIPMENT AND SUPPLIES

Equipment and supplies that will be needed to execute the field program includes:

- Medium and large-sized Ziploc bags
- Handheld GPS
- Compass
- Maps
- Waterproof markers and pencils
- Clipboard and datasheets (printed on waterproof paper)
- Vegetation field guides
- Nitrile powder-free gloves
- Garden clippers
- Trowel (preferable stainless steel)
- 99% isopropanol (for cleaning sampling utensils)
- Digital camera
- Hand lens
- Safety (e.g., handheld radio, bear spray, bear bangers) and first aid gear
- Backpack (medium to large sized)
- Coolers and ice packs (from the laboratory)
- Scale (for measurement of sample weights)
- Erasable label board for pictures

PROGRAM PLANNING AND LOGISTICS

Prior to the start of the field program, research permits will need to be acquired, field equipment and supplies obtained. Following the completion of the field program, an Export Permit for shipment of samples to a laboratory in British Columbia must be obtained.

The research permitting process will be led by the Environmental Scientist. Prior to initiating the monitoring studies, a *Scientists and Explorers Permit* under the *Yukon Scientists and Explorers Act (1958)* from the Yukon Tourism and Culture, Heritage Resources Branch, and a *Wildlife Research Permit* under the *Yukon Wildlife Act* from the Yukon Environment will be obtained.

The process for applying for the research permits requires the completion of the *Scientists and Explorers License Application* available at http://www.tc.gov.yk.ca/scientists_explorers.html. The application process may take up to three months due to the consultative component of the permit application process.

After the *Scientists and Explorers Permit* is received, the application process for the *Wildlife Research Permit* can proceed. Information, including a description of the planned research or monitoring studies, and copies of the *Scientists and Explorers* permit is provided to the Yukon Environment, Enforcement and Compliance Branch, for review. The *Wildlife Research Permit* is then issued after completion of the review. This process typically takes about a week to complete.

FIELD METHODS

1. Field Sampling Procedures

To minimize potential disturbance to wildlife and habitat from monitoring activities, the guidelines provided in Appendix B of the *Wolverine Project Wildlife Protection Plan v. 2009-01* or subsequent updates will be followed. The program will be carried out according to the methods outlined below.

- All field data will be recorded on the *Vegetation Metals Datasheet*.
- The point of commencement (POC) for each transect will be located and marked in the field at least 50 m from project infrastructure (e.g, mill site, tailings facility, access road, etc.).
- The POC location will be recorded using a handheld GPS (in UTM's). The POC, or 0 m, will be the first sampling location along each transect.
- Vegetation species found at each station will be collected. Three replicates (A, B, or C) will be collected for each species present at the station (e.g., if the willow is present, three samples of the willow will be taken). Field guidebooks will be used as required to verify species identification.
- Prior to collecting each sample, sampling bags will be labelled with the date and time collected and sample number. The sample number is comprised of the year-transect number-species-station number-sample identifier and replicate letter (e.g., 2009-MS1-LICHEN-STN1-01A).
- A minimum of 10 g wet weight will be collected for each sample. Willow samples will be collected from the same plant and will be current year growth (leaves and shoots). Only the above root portion of horsetails will be collected, multiple plants may be required to collect

sufficient plant material for each replicate. The whole plant of lichens will be collected and each replicate will be gathered from a small defined area.

- Nitrile powder-free gloves will be worn when collecting samples. If sampling utensils are used to collect samples, they will be rinsed with the isopropanol before collecting the next sample.
- Data recorded for each sample will include study areas, transect number, station number and location (in UTM's), date and time specimen collected, species collected, sample number (year-transect number-species-station number-sample identifier and replicate letter), plant part collected (i.e., stem, leaves, root, etc.), sample type (i.e., sample is from one plant only, or is a composite of more than one plant), % cover (i.e., how much of the area is covered by each sampled species), and any comments on wildlife/wildlife sign or habitat use.
- A digital photograph will be taken at each sampling location for program records.
- Samples will be placed temporarily in a cool, dark place for transport from the field, and then transferred to a designated freezer at the mine site.

PROCESSING AND STORAGE OF SAMPLES

- Upon return from the field, samples will be checked to ensure that labels and datasheets are in agreement. All samples will remain in the freezer until just prior to shipment to the laboratory.
- Prior to shipment of samples to the laboratory, a chain-of-custody form will be completed. A copy will be kept on file for project records.
- Transport coolers will be packed with frozen ice packs and samples will be placed in the coolers. All efforts will be made to ensure samples remain frozen or cool until received at the laboratory.
- Each cooler will be clearly labeled with the laboratory contact information, YZC contact information, and other appropriate labels (e.g., sample stickers). Copies of the chain-of-custody forms will be attached to the inside top of the cooler in an envelope.
- The laboratory will be notified that the samples have been shipped from site.

LABORATORY ANALYSIS

Vegetation samples will be analyzed by an accredited laboratory for metals using ICP-MS. Duplicates of selected vegetation samples and reference standards will also be completed for the purpose of QA/QC of laboratory analytical technique.

DATA MANAGEMENT

The Environmental Scientist will be responsible for ensuring that datasheets are complete and accurate, samples are packaged, labeled and stored correctly, and data management and entry procedures are accurate and complete.

All original hardcopy data and supplementary information (e.g., photographs) will be scanned and stored in an electronic format on the project network. All original hardcopy data (e.g., datasheets, maps, etc) will be filed according to standard procedures to ensure that the integrity of the data is maintained and thoroughly documented in the project files.

All monitoring data and supplementary information will be entered into an electronic database such as MS Excel or MS Access according to standard procedures. All data entered into the database will be rechecked by the person entering the data to ensure that it is correct. Discrepancies between field data and database will be identified and corrected. The Environmental Coordinator or designate will carry out quality control measures at the end of each data entry cycle.

Review of the monitoring program data will be carried out by a YZC Environmental Scientist or Wildlife Biologist to assess whether there are any immediate wildlife issues or concerns that need to be addressed, or if there are any trends associated with project components or operations that require follow-up actions.

DATA ANALYSIS AND REPORTING

Routine analysis and reporting of monitoring program results is a fundamental component of the adaptive management process. At the conclusion of the monitoring program and receipt of metal analyses, in years that the program is undertaken, a summary report will be prepared by YZC. The report will include the monitoring procedures, data results and analyses, , and appendices with the original field and laboratory data. The purpose of the summary report will be to provide a detailed record of monitoring program results, a tool for monitoring impacts to wildlife and their habitats, and to facilitate detailed review by the WTC. The report will subsequently be included in the Wolverine Project Annual Report as required by *QML-0006*.

DATASHEETS

The datasheet that will be used for this program is provided below. The datasheet will be reviewed and modified as required based on the results of the initial monitoring program.

1. Vegetation Metals Datasheet



**WOLVERINE PROJECT
VEGETATION METALS DATASHEET**

Date: _____ Field Crew: _____ Weather: Temp (°C) _____ Wind _____ Precip. _____
 Study Area: _____ Transect No.: _____ Comments: _____

Stn. No.	Station Location		Time	Species	Sample No.	Plant Part Collected ¹	Sample Type ²	% Cover ³	Comments (Habitat &/or Wildlife Use)
	UTM Easting	UTM Northing	Collected						

¹ **Plant Part Collected:** identify if the whole plant (W), leaves (L), shoot (S), or above root (AR) portion of the plant is collected.
² **Sample Type:** identify if the sample was collected from one individual plant (IND), or if it is a composite of more than one plant (COM). Composite samples will most likely be collected for lichens or horsetails to obtain a suitable amount of plant material for laboratory analysis.
³ **% Cover:** provide an estimate of how much of the sampling station area is covered by each sampled species

Appendix G Metal Levels in Small Mammals Protocol

PURPOSE

The purpose of this program is to assess baseline metal concentrations in wildlife, and determine whether levels of metals in wildlife increase from mine operation.

FOCAL SPECIES

Small mammals are the focal species group for assessing metal levels in wildlife. Species that may potentially occur in habitats in the vicinity of the Wolverine Project include arctic ground squirrel (*Spermophilus parryii*), red squirrel (*Tamiasciurus hudsonicus*), muskrat (*Ondatra zibethicus*), least chipmunk (*Eutamias minimum*), meadow jumping mouse (*Zapus hudsonius*), deer mouse (*Peromyscus maniculatus*), red-backed vole (*Clethrionomys rutilus*), heather vole (*Phenacomys intermedius*), meadow vole (*Microtus pennsylvanicus*), long-tailed vole (*M. longicaudus*), Siberian lemming (*Lemmus sibiricus helvolus*), and shrews (*Sorex* sp.).

STUDY AREAS

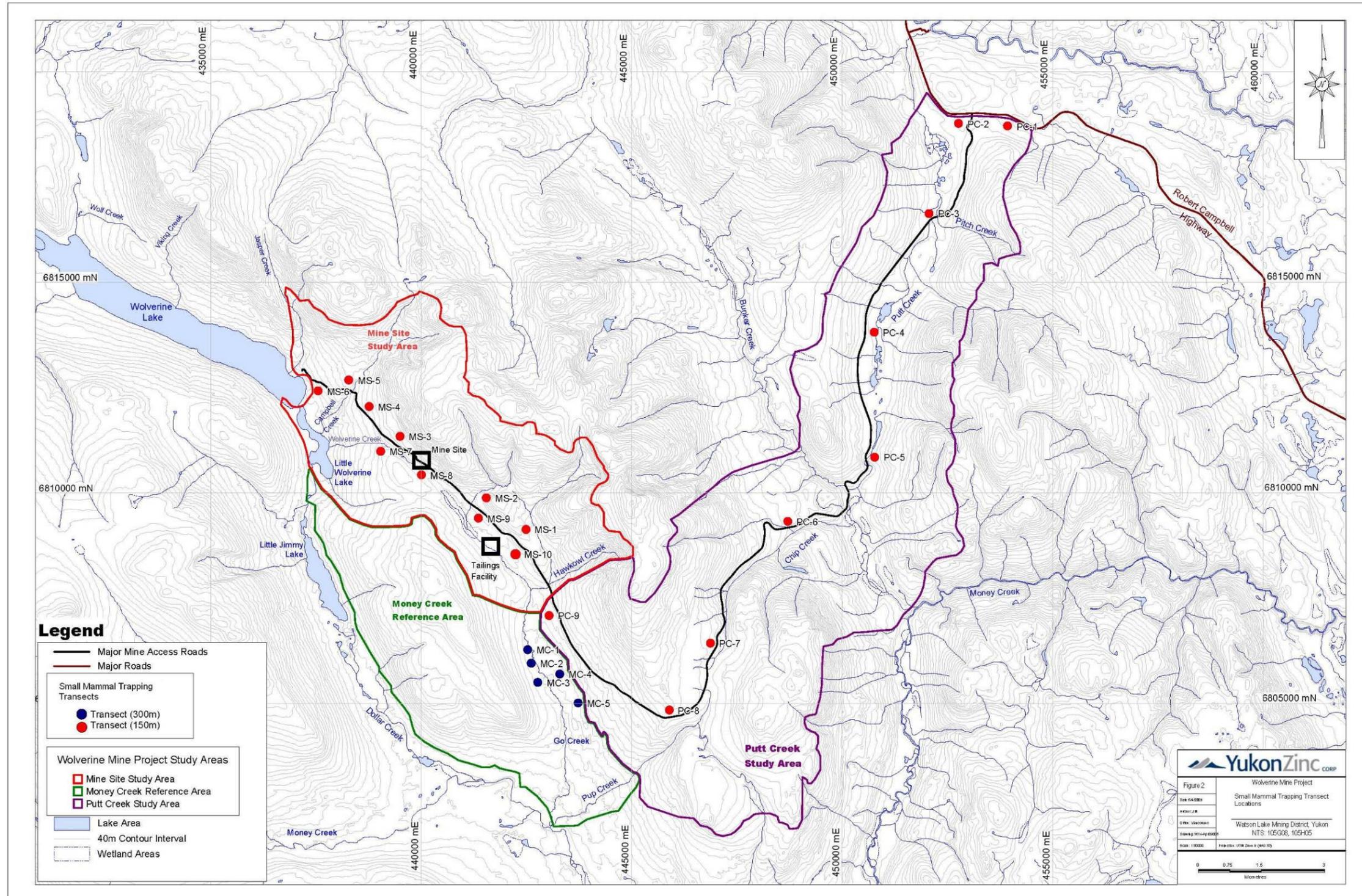
The study areas for the baseline and effects monitoring are the Mine Site Study Area (MSSA) and the Putt Creek Study Area (PCSA). These study areas roughly correspond to the wildlife local study area that was assessed during the Environmental Assessment (EA) phase of the Wolverine Project (YZC, 2005)¹. The MSSA is about 3,240 ha, and includes the mine site infrastructure (i.e., mine portal, tailings facility, camp complex, industrial complex, airstrip and landfill). The PCSA is about 7,920 ha, and includes the the access road from the mine site to its junction with the Robert Campbell Highway. The control/reference area included in the program is the Money Creek Reference Area (MCRA). The MCRA is about 2,560 ha and is situated in the Money Creek watershed, and is similar in ecosystem composition to the MSSA and PCSA. The study areas for the monitoring program are shown on Figure 1.

STUDY DESIGN

Baseline sampling for metal levels in wildlife will occur in 2009, and subsequent operational monitoring will start in 2011 and then every three years (e.g., 2014, 2017) thereafter until closure, or monitoring data indicates no contamination and the WTC is in agreement. Sampling for small mammals will occur in August.

Trapping transects will be established in each of the study areas. About ten 150-m transects will be established in the MSSA and also the PCSA. A trapping grid comprised of five 300 m transects will be established in the MCSA. Transect locations will be modified as required to address terrain or accessibility concerns during the field implementation phase. The location of transects are shown on Figure 2.

¹ Yukon Zinc Corporation (YZC). 2005. Wolverine Project Environmental Assessment Report, October 2005. Prepared by AXYS Environmental Consulting Ltd.



Trap stations will be established at 15 m intervals along each transect. Snap traps will be used to capture mice, voles, lemmings, and possibly chipmunks and squirrels, and pitfall traps will be used for shrews. The study areas will be sampled in August with each trapping session being four trap nights in duration with no pre-baiting period. The number of trap nights will be modified if small mammal density or capture rate is determined to be low. Specimens will be frozen until shipment to an accredited laboratory. Tissue samples (kidney, liver, muscles) will be extracted from the specimens by the laboratory, and analyzed for metals using ICP-MS.

PERSONNEL AND TRAINING

A field crew comprised of two people (i.e., Environmental Scientist and Environmental Technician or designates) will be required to complete the work under this monitoring program. The responsibilities of each person are outlined below.

- A YZC Environmental Scientist or designate will be responsible for ensuring that the monitoring program is conducted according to current standards and practices. In addition to participating in the field program as required, the Scientist will carry out quality control measures to ensure data is complete and accurate, , oversee data management and entry, and ensure proper processing of samples, completion of chain-of-custody forms and shipment of samples to the laboratory, and liaising with the laboratory and the WTC as required.
- The Environmental Technician or designate will participate in the field program, data management and entry, preparation and shipment of samples to the laboratory and other tasks as required on the direction of the Environmental Scientist. On-the-job training will be provided to carry out the responsibilities under this monitoring program.

A Wildlife Biologist will provide technical support for the monitoring program as needed. In addition to providing training related to the field program, the biologist may participate in the field program, program review (e.g., field methods, data collection and management, etc.), and data analysis and reporting as required.

Training will be provided in the field to ensure that data is collected in a consistent and accurate manner, and to ensure calibration among all personnel involved in the field program.

PROGRAM EQUIPMENT

Equipment and supplies that will be required to carry out this program includes:

- Museum Special Snap Traps
- Peanut butter and rolled oats (bait mixture)
- Mixing pail and stick (for bait mixture)
- Large and medium-sized Ziploc bags
- Approx. 100 1-L ice-cream pails or large cans (e.g., coffee cans)
- Nitrile powder-free gloves
- 1-L (or more) water bottle, with water (for pitfall traps)
- Portable cooler (for the field)
- Coolers and ice-packs (from the laboratory)
- Shovel and hedge clippers (for cutting through roots)
- Hand sanitizer (alcohol based)
- Hip-chain and string
- Compass
- Handheld GPS

- Flagging tape
- Waterproof markers and pencils
- Pesola scales (10 g, 100 g, and 500 g)
- Ruler (clear, plastic, or similar measuring scale with millimeters)
- Mammal identification key and field guides
- Hand lens
- Digital camera
- Clipboard and datasheets (printed on waterproof paper)
- Safety (e.g., handheld radio, bear bangers, bear spray) and first aid gear
- Personal protective equipment (as per WorkSafe BC regulations)
- Backpack (medium to large-sized for field gear, including traps)

PROGRAM PLANNING AND LOGISTICS

Prior to the start of the field program, research permits will need to be acquired, field equipment and supplies obtained, and bait prepared. Following the completion of the field program, an Export Permit for shipment of samples to a laboratory in British Columbia must be obtained.

The research permitting process will be led by the Environmental Scientist. Prior to initiating the monitoring studies, a *Scientists and Explorers Permit* under the *Yukon Scientists and Explorers Act (1958)* from the Yukon Tourism and Culture, Heritage Resources Branch, and a *Wildlife Research Permit* under the *Yukon Wildlife Act* from the Yukon Environment will be obtained.

The process for applying for the research permits requires the completion of the *Scientists and Explorers License Application* available at http://www.tc.gov.yk.ca/scientists_explorers.html. The application process may take up to three months due to the consultative component of the permit application process.

After the *Scientists and Explorers Permit* is received, the application process for the *Wildlife Research Permit* can proceed. Information, including a description of the planned research or monitoring studies, and copies of the *Scientists and Explorers* permit is provided to the Yukon Environment, Enforcement and Compliance Branch, for review. The *Wildlife Research Permit* is then issued after completion of the review. This process typically takes about a week to complete.

An Export Permit is required under the *Yukon Wildlife Act* to export animals or animal parts out of the Yukon. The Environmental Scientist will contact the Yukon Environment, Conservation Officer in Ross River to acquire an Export Permit to transport the samples to the laboratory for analysis as soon as possible after the completion of the field program. The Conservation Officer will require information on species, tissue type/animal part, and how many of each before a permit can be issued. The samples cannot be shipped to laboratory without this permit included in the shipment package.

FIELD METHODS

To minimize potential disturbance to wildlife and habitat from monitoring activities, the guidelines provided in Appendix B of the *Wolverine Project Wildlife Protection Plan v. 2009-01* will be followed. The field methods for this program have been adapted from RIC (1998)² to meet the objectives of this program, and are outlined below.

² Resource Inventory Committee (RIC). 1998. Inventory Methods for Small Mammals: Voles, Mice, Shrews and Rates. Component's for British Columbia's Biodiversity No. 31. BC Ministry of Environment, Lands and Parks, Victoria, BC.

1. Verification and Set-up of Transects

Transects for sampling will be established in each of the study areas according to the methods outlined below.

- The location of transect will be located and established before starting the trapping session. All transect data will be recorded on the *Transect Datasheet*.
- The point of commencement (POC) will be marked (e.g., with a stake), flagged, and labeled with program, transect number, distance along transect, and transect bearing (e.g., SMT, Transect MS-1, 0+000 m, 180°).
- The location will be recorded using a handheld GPS in UTM's. Detailed notes on access and transect will be documented for future reference.
- Each transect will follow a predetermined bearing. Efforts will be made to ensure that transects are within only one ecosystem type. Distance along each transect will be measured using a hip-chain..
- At 15 m intervals, sampling locations will be flagged and labeled with program transect number, station number, and distance along transect (e.g., SMT, Transect MS-1, Station 1, 0 + 015 m).

2. Small Mammal Trapping

Once transects are established, the following field methods will be followed.

- Two snap traps will be placed within 2 m of each station centre, and in areas where small mammals are likely to be active (e.g., under or along woody debris or rocks, under bushes, along worn trails). A piece of flagging tape will be hung above the trap location for easy reference during field sampling.
- At station 3 (0+30 m), station 6 (0+90 m) and station 9 (0+150 m), three pitfall traps will be installed at each station. Pitfalls should be located within 3 m of each other. The holes will be dug using a shovel and other tools as necessary, and the bucket placed in the hole. The lip of the bucket will be flush with the ground. Organic debris (e.g., branches, rocks, etc.) will be placed near each trap as necessary to attract small mammals to the pitfall trap locations.
- Snap traps will be baited with the pre-mixed peanut butter and oat bait mixture, and set open, and water will be added to the pitfall traps at set up. The date and time the traps were set will be recorded.
- Traps will be checked every day during the trapping session starting in the early morning. Transects and traps should be visited in the same order they were set.
- If an animal is captured, data will be recorded on the *Small Mammal Capture Datasheet*. This will include date and time the trap set and checked, transect number, station number, trap number (1 or 2, arbitrarily assigned in the field), morphological measurements (weight, sex class, age class). Each specimen will be assigned a specimen ID comprised of program year-species code-transect number-specimen number (e.g., 2008-PEMA-MS1-01)._Species codes are provided on the datasheet. Digital photographs will be taken of each specimen collected, and include a scale (e.g., ruler) for reference.

- For species that are unidentifiable, or unable to be classified by age class, additional measurements including total length, tail length, hind foot length, ear length, and information on pelage (i.e., colour, pattern), and other distinguishable characteristics will be recorded. Digital photographs will be taken of each specimen collected, and include a scale (e.g., ruler) for reference.
- All animals captured will be collected. Specimens will be placed in a sterile plastic bag and labeled with a specimen ID comprised of program year-species code-transect number-specimen number (e.g., 2009-PEMA-MS1-01) and date and time collected. Samples will be placed in a portable cooler for transport from the field.
- After specimens have been measured, processed, and placed in the cooler, the traps will be reset.
- Each trap session will run for a period of four-trap nights. If density of animals or capture rate is determined to be low, the number of trap nights will be modified up to 6-trap nights.
- All consumable materials (e.g., gloves, flagging) no longer usable will be taken out of the field and disposed of appropriately at the landfill.

3. Deactivation of Trap Stations and Transects

- At the completion of each four-night trap session, the snap traps and pit fall traps will be removed from the field. Holes from the pits will be filled in with the soil that was removed prior to installation.
- Flagging and other materials used in the field will be removed, except for the POC marker, and disposed of at the landfill as appropriate.
- Traps will be cleaned, disinfected (e.g., with bleach and water), and stored after the completion of each monitoring period (e.g., 2009).

PROCESSING AND STORAGE OF SAMPLES

- All samples collected will be transferred from the portable cooler to a designated freezer at the mine site. .
- After all samples have been collected, the Environmental Scientist will coordinate with the expeditor to ensure that samples will be shipped out on the earliest flight possible so that samples remain frozen until received by the laboratory.
- Each cooler will be labeled with laboratory address, YZC contact person, and sample stickers. Copies of the Export Permit and chain-of-custody forms will be placed in an envelope and attached securely to the top of the cooler lid.
- The laboratory will be notified that the samples have been shipped from site. Samples will be shipped out early to mid-week to ensure that laboratory staff is available to receive the shipment when it arrives.

LABORATORY ANALYSIS

Samples will be analyzed by an accredited laboratory for metals using ICP-MS. Tissue samples (kidney, liver, muscle) from the specimens will be extracted by the laboratory, and analyzed for metals using ICP-MS. Duplicates of selected tissue samples and reference standards will also be completed for the purpose of QA/QC of laboratory analytical technique.

DATA MANAGEMENT

The Environmental Scientist will be responsible for ensuring that datasheets are complete and accurate, samples are packaged, labeled and stored correctly, and data management and entry procedures are accurate and complete.

All original hardcopy data and supplementary information (e.g., photographs) will be scanned and stored in an electronic format on the project network. All original hardcopy data (e.g., datasheets, maps, etc) will be filed according to standard procedures to ensure that the integrity of the data is maintained and thoroughly documented in the project files.

All monitoring data and supplementary information will be entered into an electronic database such as MS Excel or MS Access according to standard procedures. All data entered into the database will be rechecked by the person entering the data to ensure that it is correct. Discrepancies between field data and database will be identified and corrected. The Environmental Coordinator or designate will carry out quality control measures at the end of each data entry cycle.

Review of the monitoring program data will be carried out by a YZC Environmental Scientist or Wildlife Biologist to assess whether there are any immediate wildlife issues or concerns that need to be addressed, or if there are any trends associated with project components or operations that require follow-up actions.

DATA ANALYSIS AND REPORTING

Routine analysis and reporting of monitoring program results is a fundamental component of the adaptive management process. At the conclusion of the monitoring program and receipt of metal analyses, in years that the program is undertaken, a summary report will be prepared by YZC. The report will include the monitoring procedures, data results and analyses, , and appendices with the original field and laboratory data. The purpose of the summary report will be to provide a detailed record of monitoring program results, a tool for monitoring impacts to wildlife and their habitats, and to facilitate detailed review by the WTC. The report will subsequently be included in the Wolverine Project Annual Report as required by *QML-0006*.

DATASHEETS

The datasheets for this monitoring program are provided below. The datasheets will be reviewed and modified as required based on the results of the monitoring program and input from the WTC.

1. Small Mammal Transect Datasheet
2. Small Mammal Capture Datasheet



**WOLVERINE PROJECT
SMALL MAMMAL TRANSECT DATASHEET**

Study Area: _____

Date: _____

Field Crew: _____

Transect ID	POC Location		POT Location		Bearing (°)	Transect Length (m)	Distance between Stations (m)	General Habitat Description
	UTM Easting	UTM Northing	UTM Easting	UTM Northing				

Instructions for Small Mammal Capture Datasheet

1. **Obs. No.:** Assign a unique observation ID to each specimen starting at one (1). Will be used for the specimen ID (see point 4).
2. **Trap Type:** refers to snap trap (S) or pitfall trap (P)
3. **Trap No.:** refers to trap number; arbitrarily assigned by trap type. A trap number of 1 or 2 is assigned for S; and 1, 2 or 3 for P.
4. **Specimen ID:** program year – species code – transect number – observation number (e.g., 2009-PEMA-MS1-01). Specimen number is arbitrarily assigned in the order captured along each transect. Species codes are provided below in Table 1.
5. **Species codes** for mammals are based, in general, on the first two letters in the genus and species. Species codes for small mammals that may be captured are provided in Table 1 below.

Table 1. Small Mammal Species Names and Codes

Common Name	Scientific Name	Species Code
Arctic ground squirrel	<i>Spermophilus parryii</i>	SPPA
Red squirrel	<i>Tamiasciurus hudsonicus</i>	TAHU
Muskrat	<i>Ondatra zibethicus</i>	ODZI
Least Chipmunk	<i>Eutamias minimum</i>	EUMI
Meadow jumping mouse	<i>Zapus hudsonius</i>	ZAHU
Deer mouse	<i>Peromyscus maniculatus</i>	PEMA
Red-backed vole	<i>Clethrionomys rutilus</i>	CLRU
Heather vole	<i>Phenacomys intermedius</i>	PHIN
Meadow vole	<i>Microtus pennsylvanicus</i>	MIPE
Long-tailed vole	<i>Microtus longicaudus</i>	MILO
Siberian lemming	<i>Lemmus sibiricus helvolus</i>	LSHE
Shrew	<i>Sorex</i> sp.	SOSP

6. **Weight:** measured in grams using the spring Pesola scales. Use appropriate size for species being weighed.
7. **Sex Class:** male (M), female (F), unknown (U)
8. **Age Class:** adult (A), sub-adult (SA), and juvenile (J)
9. **Body Length (BL):** total length of the animal minus the tail vertebrae length (i.e., body length minus the tail)¹
10. **Tail Length (TL):** length of the tail measured from the base of tail to last vertebra¹
11. **Hind Foot Length (HL):** length of hind foot measured from edge of heel to end of the longest claw¹
12. **Ear Length (EL):** length of ear measured from the ear notch¹
13. **Pelage:** description of the hair or fur of the animal¹
14. **Comments:** this may include reference to any distinguishing characteristics of the specimen, habitat characteristics, or observations of wildlife or wildlife sign in vicinity of station.

¹ Descriptions adapted from: Nagorsen, D.W. 2002. An Identification Manual to the Small Mammals of British Columbia. Ministry of Sustainable Resource Management, Ministry of Water, Land and Parks, and Royal BC Museum, Victoria, BC.

Appendix H Wildlife Protection Plan Contact Information



**WOLVERINE PROJECT
WILDLIFE PROTECTION PLAN
CONTACT INFORMATION**

Provided below is the list of the primary contacts associated with the *Wolverine Project Wildlife Protection Plan v. 2009-01*. This list will be updated as required.

Organization/Agency	Contact Person	Telephone	Email
General			
YZC Corporate Office (Vancouver, BC)	Pamela Ladyman VP Environment & Community Affairs	604.682.5474 x 246	pamelaladyman@yukonzinc.com
	Melissa Kirby Environment and Safety Coordinator	604.682.5474 x 250	mkirby@yukonzinc.com
YZC Wolverine Mine Site	Robin McCall Environmental Scientist	604.678.4948 x 3	rmccall@yukonzinc.com
	Jennie Gjertsen Environmental Scientist	604.678.4948 x 3	jgjertsen@yukonzinc.com
YE, Conservation Office	Debra Morris Conservation Officer (Ross River)	867.969.2202	debra.morris@gov.yk.ca
Wildlife Technical Committee			
YZC	Natasha Essar (on behalf of YZC)	604.801.7240 x 2223	nessar@yukonzinc.com
	Robin McCall	604.678.4948 x 3	rmccall@yukonzinc.com
	Shae Dalphond	604.682.5474 x 243	sdalphond@yukonzinc.com
	Melissa Kirby/Pamela Ladyman	604.682.5474 x 250	mkirby@yukonzinc.com
Ross River Dena Council Ross River, YT	Norman Barichello Nora Ladue Dorothy Dick		nbarichello@northwestel.net noraladue@gmail.com dorothy.dick@gmail.com
Liard First Nation Watson Lake, YT	Jim Wolf tail Jillian Chown (Keyeh Neje Golder)		jwolf tail@kaska.ca Jillian_Chown@golder.com
Yukon Environment	Troy Pretzlaw (Watson Lake, YT) Pat Paslawski (Whitehorse, YT)		troy.pretzlaw@gov.yk.ca pat.paslawski@gov.yk.ca