



WILDLIFE PROTECTION PLAN

KENO HILL SILVER DISTRICT MINING OPERATIONS

August 2012



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1 INTRODUCTION

The Wildlife Protection Plan (WPP) is being expanded to provide general wildlife management objectives and protocols for the Keno Hill Silver District Mining Operations. The plan presented is an update of the Wildlife Protection Plan developed by Alexco Keno Hill Mining Corporation (AHMC) in 2009. Certain elements of the original WPP have been changed to reflect current work activities, anticipated developments and a better understanding regarding wildlife usage of the area from three years of observations. Also included in this Management Plan are lists of mammals that reside for part of their life cycle in the Keno Hill Silver District (KHSD) plus an update on the wildlife species that have been identified federally or territorially to be sensitive and need to be monitored more closely.

1.1 BIOPHYSICAL DESCRIPTION

The Keno Hill Silver District (KHSD) is located in the Boreal Cordillera Ecozone in the North Yukon Plateau Ecoregion (Smith et al.) and is just south of the boundary with the Mackenzie Mountains Ecoregion. The board valley and rounded mountains, typical of the area around Keno, were formed during the McConnell glaciation period. Retreat of the glaciers left a landscape forged from melt water erosion and debris deposits. The McQuesten River is to the northwest of the KHSD it meanders along a wide valley corridor fed by an extensive complex of wetlands, small lakes and secondary creeks. A number of tributaries feeding the McQuesten River originate from within the Alexco mine claims properties, such as Christal and Flat Creeks.

Vegetation communities in the area are delineated by elevation, the alpine tundra is above 1500m, it is characterized by low growing shrubs, graminoids and lichen covered rocks. Below this elevation is the sub alpine zone with small scattered groups of white spruce in swaths of willow and scrub birch. As elevation decreases white spruce forests with minor components of aspen and birch dominates the mid and lower slopes. North facing slopes are dressed with open canopy black spruce forests growing out of a thick carpet of moss, Labrador tea shrubs are common. Along the valley floor are large fens with thick organic soils, interconnect with a network of streams. Sedges and cotton grass tussocks are common with a variety of forbs and shrubs, islands of spruce occur on higher ground.

The area is characterized by extensive discontinuous permafrost especially along northern aspects and areas with thick organics. The common soils types found in the area are: Brunisols, Cryosols, Gleysols, Regosols and Organics.

1.2 WILDLIFE

The wildlife that utilize the KHSD, have coexisted with human mining activity over the last century. The First Nation of Na-Cho Nyak Dun (NND) and their ancestors have harvested animals and plants from the region for millennium and have in-depth knowledge of the movement and key habitats of many of the different wildlife. By knowing what animals are present in or near the Alexco claim properties, management plans can be better tailored to protect their key habitats and reduce hazards where possible.

Table 1 Wildlife Species Occurring or Having Potential to Occur in the KHSD Area

| INSECTIVORES | |
|--------------------------|--------------------------------|
| Black backed Shrew | <i>Sorex arcticus</i> |
| Common Shrew | <i>Sorex cinereus</i> |
| Dusky Shrew | <i>Sorex monticolus</i> |
| Pygmy Shrew | <i>Sorex hoyi</i> |
| Water Shrew | <i>Sorex palustris</i> |
| BATS | |
| Little Brown Myotis | <i>Myotis lucifugus</i> |
| LAGOMORPHS | |
| Collared Pika | <i>Ochotona collaris</i> |
| Snowshoe Hare | <i>Lepus americanus</i> |
| RODENTS | |
| Arctic Ground Squirrel | <i>Spermophilus parryii</i> |
| Beaver | <i>Castor canadensis</i> |
| Brown Lemming | <i>Lemmus sibiricus</i> |
| Bushy-tailed Woodrat | <i>Neotoma albigula</i> |
| Deer Mouse | <i>Peromyscus maniculatus</i> |
| Heather Vole | <i>Phenacomys intermedius</i> |
| Hoary Marmot | <i>Marmota caligata</i> |
| Least Chipmunk | <i>Tamias minimus</i> |
| Long-tailed Vole | <i>Microtus longicaudus</i> |
| Meadow Jumping Mouse | <i>Zapus princeps</i> |
| Meadow Vole | <i>Microtus pennsylvanicus</i> |
| Muskrat | <i>Ondatra zibethicus</i> |
| North American Porcupine | <i>Erethizon dorsatum</i> |
| Northern Bog Lemming | <i>Synaptomys borealis</i> |
| Northern Flying Squirrel | <i>Claucomys sabrinus</i> |
| Northern Red-backed Vole | <i>Clethrionomys rutilus</i> |
| Red Squirrel | <i>Tamiasciurus hudsonicus</i> |
| River Otter* | <i>Lutra Canadensis*</i> |
| Singing Vole | <i>Microtus miurus</i> |
| Taiga Vole | <i>Microtus xanthognathus</i> |
| Tundra Vole | <i>Microtus oeconomus</i> |
| Woodchuck | <i>Marmota monax</i> |
| CARNIVORES | |
| American Marten | <i>Martes Americana</i> |
| Black Bear | <i>Ursus americanus</i> |
| Coyote | <i>Canis latrans</i> |
| Cougar | <i>Puma concolour*</i> |
| Ermine | <i>Mustela erminea</i> |
| Gray Wolf | <i>Canis lupus</i> |
| Grizzly Bear | <i>Ursus arctos</i> |
| Lynx | <i>Lynx canadensis</i> |
| Least Weasel | <i>Mustela nivalis</i> |
| Mink | <i>Mustela vison</i> |
| Red Fox | <i>Vulpes vulpes</i> |
| Wolverine | <i>Gulo gulo</i> |
| UNGULATES | |
| Moose | <i>Alces alces</i> |
| Woodland Caribou | <i>Rangifer tarandus*</i> |
| Mule Deer | <i>Odocoileus hemionus*</i> |
| Dall Sheep | <i>Ovis dalli*</i> |

* Indicates wildlife species that are uncommon in area or have not migrated as far north yet, but their range is expected to expand eg. Cougar.

1.3 SENSITIVE WILDLIFE SPECIES

Table 2 lists wildlife species that may be found in the KHSD that are recognized by federal or territorial governments to need extra protection and/or monitoring. Alexco is aware of the status of these species and records any sightings (CDC, 2012).

Table 2 Yukon Wildlife Species Considered Sensitive

| Species | Status | Source |
|---|----------------------|---|
| Peregrine Falcon (<i>Falco peregrinus anatum - tundrius</i>) | Special concern | COSEWIC (2007), Yukon Wildlife Act (2002) |
| Short Eared Owl (<i>Asio flammeus</i>) | Special concern | COSEWIC (2008) |
| Common Nighthawk (<i>Chordeiles minor</i>) | Threatened | COSEWIC (2007) |
| Olive-sided Fly Catcher (<i>Contopus cooperi</i>) | Threatened | COSEWIC (2007) |
| Rusty Blackbird (<i>Euphagus carolinus</i>) | Special concern | COSEWIC (2006) |
| Gyrfalcon (<i>Falco rusticolus</i>) | Specially protected | Yukon Wildlife Act (2002) |
| Trumpeter Swan (<i>Cygnus buccinator</i>) | Specially protected | Yukon Wildlife Act (2002) |
| Barn Swallow (<i>Hirundo rustica</i>) | Threatened | COSEWIC (2011) |
| Bank Swallow (<i>Riparia riparia</i>) | Conservation concern | Yukon Environment (2011) |
| Canada Warbler (<i>Wilsonia canadensis</i>) | Threatened | COSEWIC (2008) |
| Northern Shrike (<i>Lanius excubitor</i>) | Conservation concern | Yukon Environment (2011) |
| Wolverine (<i>Gulo gulo</i>) | Special concern | COSEWIC (2004) |
| Grizzly Bear (<i>Ursus arctos</i>) | Special concern | COSEWIC (2009) |
| Woodland Caribou (<i>Rangifer tarandus caribou</i>) | Special concern | COSEWIC (2002), SARA (2002) |
| Mule Deer (<i>Odocoileus hemionus</i>) | Specially protected | Yukon Wildlife Act (2002) |
| *Mountain Goat (<i>Oreamnos americanus</i>) | Conservation concern | Yukon Environment (2011) |
| *Cougar (<i>Puma concolor</i>) | Specially protected | Yukon Wildlife Act (2002) |
| Collared Pika (<i>Ochotona collaris</i>) | Special concern | COSEWIC (2011) |

*Some of the species in the above table are unlikely to be found in the KHSD as there may not be adequate habitat for certain animals, for example Mountain Goats need steep mountainous terrain with access to good forage which is not typical of the geomorphology of the area. They are still included in the table in case they do appear in the ensuing years due to environmental changes.

Distribution and status of amphibians is largely unknown in the territory. Wood frogs are the most common amphibian that have been reported in the vicinity.

The last aerial moose survey was conducted in 2011 by Yukon Environment biologists; the draft report indicates that the moose population in the Mayo-Elsa-Keno area are experiencing a slight decline in population numbers compared to previous surveys (per. comm. Mark O'Donoghue). It is suspected that overharvesting may have been the main cause for lower numbers of moose.

1.4 GENERAL WILDLIFE PROTOCOLS

- Approaching and feeding wildlife is prohibited. There are absolutely no exceptions to this rule. All employees and contractors are to avoid contact with wildlife that occurs within work sites or camp area.
- Harassment and disturbance of wildlife is prohibited. If any employees and contractors are approaching a work site and sensitive species (as listed in Table 2) are in the area, this work site will

be avoided until the animals have moved away. If den sites or nests are discovered during work activities, these locations will be recorded and avoided until they are no longer in use by wildlife. Bird nests and/or eggs are not to be moved or disturbed.

- Hunting of wildlife is prohibited. While conducting business on behalf of Alexco Resource Corporation, hunting is strictly forbidden.
- Waste will be managed properly. Proper food storage and handling of cooking wastes will prevent problems with attracting wildlife. Camp and work sites need to be kept clean and food properly stored. Kitchen waste will be burned in an approved incinerator on a daily basis. Burn area and garbage containers needs to be secured, so wildlife will not use garbage as a food source. Other attractants such as solid waste and/or hazard waste should be stored securely and removed to a regulated landfill on a regular basis.
- Nuisance wildlife will be reported immediately to local Conservation Officer.
- Firearms will only be carried for safety reasons. Firearms may be carried for safety reasons, but only if such firearms are properly registered and stored in accordance with applicable legislation. All firearm discharges must be reported to the Project Manager.
- A qualified Environmental Coordinator is employed to:
 - Ensure above that environmental and wildlife policies are being adhered to;
 - Conduct site inspections regularly;
 - Recommend modifications to improve wildlife policies; and
 - Liaise with regulatory agencies, Conservation Officer, Regional Biologist, Na-Cho Nyak Dun (NND) First Nation and nearby communities.
- Sightings of wildlife will be recorded. Sightings of wildlife will be recorded by all employees and contractors on the wildlife sightings sheets provided (see Appendix A). This information will be reported to Environment Yukon: Conservation Data Centre (CDC) and NND on an annual basis.
- During development and operations, this wildlife protection plan will guide activities. During temporary closure, Alexco will ensure that all sites are fenced, and all open holes and shafts and adits are blocked in order to prevent wildlife entrapment.
- Land disturbance will be timed to avoid the core migratory bird breeding period of May 1st to July 31st. In the even that land disturbance must occur during that time, the nests of birds listed under the Migratory Birds Convention Act will not be disturbed or destroyed.
- During the winter months, breaks in snow-banks on main access roads will be created to facilitate wildlife crossing and exiting the road.
- Project staff will be made aware of collared pika, including how to identify the animal and key signs of habitat.
- The Regional Biologist and Conservations Officer will be contacted to determine camp areas that should be enclosed in electric fencing and areas where additional bear deterrent measures are required.



2 TOPICS OF CONCERN AND PROTECTION MEASURES

The objective of the procedures described below is to mitigate adverse impacts on wildlife by minimizing disturbance to the animals and their habitat, and minimizing disruption of their free movement.

Table 3 Wildlife Concerns and Protection Measures

| Topic of Concern | Protection Measures |
|---|---|
| General | <ul style="list-style-type: none"> All incidents and interactions with wildlife shall be reported to the District Conservation Officer in Mayo (Kevin Johnstone (867) 996-2202, as well as any other communication regarding wildlife. Every effort shall be made to avoid disturbing wildlife. The provisions of the Quartz Mining Land Use Regulations Schedule 1 Operating Conditions will be adhered to. The Regional Biologist (Mark O'Donoghue @ (867)996-2162) will be contacted in regards to sensitive species and habitats within the mine sites that warrant special consideration. |
| Access Management | <ul style="list-style-type: none"> Public access to the mill site will be controlled by means of signage at the mine site, mill site and all site haul and access roads. Public access to the mine site, ponds and adits will be controlled by signage or gates and/or fencing Speed limits will be enforced for mine traffic and posted along the access and site roads (maximum 40 km/hr, reduced to 20 km/hr at blind corners and bridge crossings). Mine traffic between the mill and the mine site will be radio controlled for safety and speed control. To the maximum extent possible employees will be encouraged to take advantage of project bussing and transportation from Mayo/Elsa to the mine and mill site, thereby minimizing road mortalities; Private employee all-terrain vehicles will be prohibited on the access road and at the mine site. Existing trails and disturbed areas will be used where possible to minimize the addition of new linear corridors and there will be no unnecessary disturbance to the organic mat and soils. |
| Harassment | <ul style="list-style-type: none"> As provided for in sections 92 and 93 of the <i>Wildlife Act</i>, the proponent shall not harass wildlife or encourage wildlife to become a public nuisance. Employees will undergo wildlife orientation, which will encompass no wildlife feeding, wildlife avoidance, and bear awareness among other topics. Project personnel will not be allowed to have pets in camp. |
| Ecologically Sensitive Areas | <ul style="list-style-type: none"> Every precaution will be taken to avoid disturbance of wildlife sensitive areas, including but not limited to: mineral licks, calving, denning or nesting sites. Vegetative buffer zones will be maintained around stream riparian areas and facilities to minimize wildlife disturbance and protect wildlife corridors. |
| Wildlife Movement | <ul style="list-style-type: none"> Subject to safety concerns (WCB requirements for haul roads) snow plows on the access road will create breaks in snow berms where possible to allow for wildlife to escape from the access road. Wildlife have the right of way; vehicle operators should be prepared to slow down or come to a stop if animals are on roads or trails. All project activities will be contained to the project area. Personnel movement will be restricted to the project area and access routes. Wildlife movements will not be restricted. Windrows or steep sided berms will not be created that restrict wildlife movements, with the exception of roll over protective berms on haul roads. |
| Wildlife Mortality | <ul style="list-style-type: none"> Speed limits and signage will be posted to minimize vehicle/wildlife collisions. Collisions between wildlife and project vehicles along the mine haul route may result in changes to the Traffic Management Plan to minimize these effects. |
| Wildlife Monitoring and Surveillance Plan | <ul style="list-style-type: none"> Wildlife monitoring is outlined within the Environmental Monitoring Program and includes maintaining a wildlife observation log onsite; reporting wildlife encounters. A copy of the wildlife log book and summary will be submitted in the annual report. Environmental personnel on site will monitor project activities and modify operations to address wildlife concerns. |
| Hunting and Fishing | <ul style="list-style-type: none"> Project personnel will not be permitted to have firearms on the project site, unless authorized as a safety precaution. Employees and sub contractors are prohibited from hunting and discouraged from fishing while on the mine site, including during travel to and from the site. |

| Topic of Concern | Protection Measures |
|------------------------------|---|
| Migratory Birds | <ul style="list-style-type: none"> • Mill pond will be monitored to ensure waterfowl and shorebirds do not settle in Mill pond. • Areas to be cleared will be surveyed prior to work activities to ensure that migratory birds, their eggs or active nests are not disturbed. |
| Bears | <ul style="list-style-type: none"> • The Company will have an employee bear awareness program. • The camp shall be equipped with bear deterrent devices and the devices shall be maintained in good working order throughout the duration of camp occupancy. • A Waste Management Plan is provided (section 6.0). Routine garbage patrols will be undertaken to remove materials, (e.g., metals, plastics, grease) which may be potentially harmful to wildlife. Garbage and debris destined for disposal will be collected routinely and prior to incineration stored in wildlife proof containers / fenced short term storage areas in a manner which does not attract wildlife to the mine site. Solid waste will be frequently and completely incinerated at the Elsa Solid Waste Management Facility in a manner which minimizes odours and eliminates the attraction of bears and other wildlife to the mine site. Nuisance bears shall be reported to Yukon Government authorities. • The electrified fence installed around the perimeter of the Elsa Solid Waste Management Facility will be kept in good working order and routinely checked. • In the event that bears or other wildlife become a nuisance or problem at the camp, the Company will immediately contact the local Conservation Officer and take appropriate measures. |
| Caribou | <ul style="list-style-type: none"> • All caribou observations will be reported to the Regional Biologist in Mayo • If caribou are observed on the project site between 15 May and 30 June, construction activities will be minimized to reduce disturbance of caribou calving. |
| Pika | <ul style="list-style-type: none"> • Pre-activity surveys for collared pika on talus slopes will be conducted prior to commencing new activities. YG Environment will be contacted for advice on identifying collared pika and corresponding habitat. Any sighting of collared pika in the pre-activity survey and/or during project activities will be logged and reported to the Yukon Conservation Data Centre. |
| Riparian Areas | <p>To avoid major erosion and sedimentation problems the following general practices will be implemented:</p> <ul style="list-style-type: none"> • The area of clearing and disturbed soil will be minimized – existing trails and disturbed areas will be used where possible to minimize the addition of new linear corridors and there will be no unnecessary disturbance to the organic mat and soils; • Erosion protection measures (riprap, earth breaks or cross ditches) will be implemented as required; • Early construction of diversion ditches and sediment control ponds to manage runoff and provide for settling of suspended solids will be implemented with inspection to ensure effectiveness; • Construction activities will be completed efficiently to minimize the length of time disturbed soils are exposed; • Where soils are exposed revegetation efforts will be made in a timely manner. • Site clearing will be timed to minimize soil compaction. To the maximum extent possible, disturbances will be restricted to times when soils are dry or frozen and avoid or delay construction during wet site conditions; • Riparian areas will not be unnecessarily disturbed – a minimum buffer of 30 m will be maintained from surface watercourses to protect riparian areas and wildlife corridors; • The Construction Surface Water Management Plan will be followed and adapted as required to manage changing or unexpected site conditions. |
| Trapping and Traditional Use | <ul style="list-style-type: none"> • Trap line trails and trapping areas will not be disturbed; • Continued access to traditional harvest areas will be provided. |

2.1 WILDLIFE MITIGATION AND PROTECTION POLICIES

Employees and contractors of the company will be trained in internal policies, procedures and made familiar with the terms and conditions of the project's licenses and permits. Training will include but not be limited to:

- Spill response,
- Bear safety,
- Wildlife policies and regulations ,

- Wildlife mitigation best practices, and
- Effects of disturbance on wildlife species of special concern.

The KHSD supports a rich diversity of wildlife, which is recognized by Alexco as an important ecological component of the area in which the mine sites are situated. The company will continue to provide the best management practices toward the protection and mitigations against disturbances to wildlife and sensitive habitat.

2.2 ADAPTIVE MANAGEMENT

As development on Alexco claims property progresses, and as the results of further studies become available, the wildlife protocols and mitigations presented in this document will be revised as necessary to reflect changing site conditions, activity levels and to continue to mitigate potential effects on wildlife. The following measures will be employed to facilitate adaptive management of wildlife:

- The Environmental Coordinator will make recommendations to management about additional protocols or measures to implements or changes to existing protocols or measures that may help to further mitigate potential effects on wildlife;
- The Environmental Coordinator will liaise with Environment Yukon, NND and communities and will incorporate their recommendations as appropriate;
- The local Conservation Officer will be notified about significant wildlife occurrences at site and the Environmental Coordinator will work to implement the CO's recommendations into site practices and protocols.

2.3 REPORTING

On an annual basis, a wildlife report will be submitted to Environment Yukon and NND, which incorporates the following:

- Wildlife sightings on the Alexco claims Property;
- Wildlife management issues/ wildlife incidents (e.g. bears in camp);
- Comments on the effectiveness of wildlife protocols and mitigation measures and proposed modifications to improve their effectiveness; and
- Results of any surveys or studies conducted.

3 REFERENCES

Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 2009. Website accessed May 2012 at: http://www.cosewic.gc.ca/eng/sct1/index_e.cfm

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APPENDIX A

WILDLIFE SIGHTING SHEET

Wildlife Sighting Sheet

Date (D/M/Y): _____ Time: _____

Observers name(s): _____

Location Information

Site Description : _____

GPS Coordinates: E: _____ N: _____

Weather Conditions:

Fog _____ Snow _____ Rain _____ Clear _____ Cloudy _____

Approx. wind speed: _____ Approx Temperature: _____

Total number of animals observed:

Males: _____ Females: _____ Young: _____

Estimated distance of animals from personnel/facility: _____

Activity being observed: _____

Behaviour:

Curious: _____ Moving Away: _____ *Running Away:* _____ Feeding: _____

Resting: _____ Other: _____

If moving, in what direction were they headed? _____

Description of Encounter (include mitigative measures): _____

Who was informed of sighting? _____

Supervisor: _____ Site manager: _____ CO: _____ Env Monitor: _____

Other: _____

