

10 Yukon Conservation Society Comments and YZC Responses

10.1 General Comments

Below are the responses to the comments of concern from the Yukon Conservation Society (YCS):

- The presence of iron sulphides such as pyrite and chalcopyrite, which are acid generating when oxidized is of concern. With the presence of potential problematic contaminants within the ore samples including trace metals that come from sulphide minerals, mitigation measures to treat acid rock drainage (ARD) are necessary. Continual testing should include a humidity cell test.

YZC Response:

All ore samples will be processed shortly after being hauled to surface. Section 6.4.9 contains details of pertaining to flooding of the mine as well as other mitigation measures to prevent ongoing oxidation of the underground workings. Humidity cell testwork is detailed in Appendix D.

- Mining consumes great amounts of water at all stages of production. The amount of water available within the aquifer is a concern. It is important not to threaten the ability of the local drainage to support life, by removing more water than it can sustain.

YZC Response:

Details pertaining to water supply are provided in Section 9. Approximately 94% of water used in the mill and for portal uses will be reclaimed from the tailings facility, with surface waters providing the majority of the input. The only groundwater well for potable water is located in the upper Go Creek watershed.

- No closure plan is included in this document. A full environmental review of the closure plan, and a commitment to posting a bond for the closure are essential before approval of this plan can be considered.

YZC Response:

The closure plan for the project is documented in EAR Section 3.4. An environmental assessment was conducted for the closure scenario which was derived from the closure plan (see Project Effects discussions for each environmental discipline in EAR Section 7).

10.2 Project Components

10.2.1 Overview of Project Components, Design Criteria and General Layout

- The proponent states that the project has and will continue to follow the general criteria. “The project must meet or exceed...and demonstrate minimum environmental impact.” Inspection Reports for Yukon Zinc provides question as to what minimal environmental impact means to the proponent. Within the October 20th inspection report it was noted that previous recommendations have not been put into

practice. For example, “waste rock and ore continue to be stored on the unlined portal pad”, this does not demonstrate minimum environmental impact.

YZC Response:

The waste rock and ore stored at the portal pad pose no environmental risk due to frozen conditions. The material was in the process of being moved to the temporary waste rock pad when the onset of extremely cold conditions limited YZC’s ability to break the piles apart. YZC is committed to moving the piles in early spring 2006. The piles have been tarped in the interim. All the runoff from the area is collected via a buried french drain that discharges to the dirty sump, again posing minimal environmental risk.

Recommendation

Yukon Zinc must define for their employees what minimal environmental impact means. In addition, further recommendations by The Yukon Government (YG) must be put into effect in a timely manner to minimize environmental impacts.

YZC Response:

For the purposes of the EAR, impact magnitude for each Valued Ecosystem and Cultural Component (VECC) is defined in the Effects Assessment Methodology sections for each chapter of EAR Section 7. These definitions integrate established regulatory thresholds for environmental protection where these exist and current scientific understanding of requirements for VECC sustainability. Where project effects cannot be predicted with confidence, monitoring programs are identified with contingency measures for mitigation in the event of unexpected effects. All project staff and contractors will be provided with environmental training in conjunction with the roll-out of the project Environmental Management Plan (EAR Section 9) to ensure that YZC will meet all commitments to environmental protection and management which are documented in the EAR and subsequent construction and operational permits.

10.2.2 Humidity Cells

- The humidity cell was carried out for a period of 26 weeks. Some mines have continued kinetic tests, such as the humidity cell, for up to five years. YCS highly recommends that Yukon Zinc continues to perform humidity cell testing, particularly because of uncertainty and associated risks. Morin and Hutt (1997) highlight four misconceptions about humidity cells. YCS wants reassurance that aqueous concentrations in the weekly rinse water were not considered as direct predictions of on-site drainage chemistry. The excess rinse water is used to thoroughly remove and dilute the reaction products so that solubilities of most secondary minerals are not attained.

YZC Response:

Section 6.3 and Appendix D detail the humidity cell testwork. The testing has been conducted as per industry standards and will continue as necessary.

10.2.3 Post-Closure Mine Water Quality Estimate

- Mine water quality is expected to stabilize once the mine is flooded. This process requires available soluble metals to be released into the mine water, and sulphide oxidation ceases due to lack of oxygen. The mitigation practices suggested to deal with mine water that doesn’t stabilize once the mine is flooded are unacceptable.

YZC Response:

Sections 6.4.9 and 6.4.10 describes the proposed mitigation measures and monitoring requirements within the Wolverine Creek watershed.

10.2.4 Conclusions

- With the bulk of the Wolverine deposit being likely to be potentially acid generating ARD has major adverse implications to the environment that haven't been fully addressed within this document. The project must not go ahead until the potential for ARD is dealt with.

YZC Response:

Management of ARD and metal leaching is recognized as the driving factor for project design and management, as reflected in the ongoing geochemical testing programs, tailings and waste rock management, mine and site drainage management, and closure plans which have been documented in the EAR and this response document Sections 6.3, 6.4, 7, 8, and 9).

10.2.5 Dense Media Separation Operations

- The DMS plant is using dense slurry of fine ferro-silicon. What environmental impacts are related to this slurry? The safety (MSDS) data for ferrosilicon is deficient, stating only that the dust should not be inhaled. From a health and safety perspective more research should be done on ferrosilicon prior to use.

YZC Response:

The industrial complex is a contained site and all discharges and DMS float will be deposited in the tailings facility (see Section 9). Ferro-silicon poses no environmental risk due to the proposed site water and waste management plans.

10.2.6 Waste Rock

- Zoning of waste rock should be included in the mine plans. There should be detailed records as to rock type and distribution of the rock so that if problems arise with waste rock all areas can be addressed. Maintaining a detailed description of rock type and storage can benefit future site use. The Faro site is an example of what problems can arise when rock type and location is not recorded.

YZC Response:

As detailed in Section 8, the temporary waste rock pad will be decommissioned within the first couple of years of operations. In addition, all material on the pad is considered to be potentially acid generating and will not be used elsewhere on the site. Waste rock will be moved to the tailings facility and covered with both DMS float and water to prevent oxidation.

10.2.7 Tailings Storage Facility

- Use of the waste rock to build the dykes may potentially pose a problem. Ore that is characterized as "oxidized" will leach well after sulphide minerals are oxidized. It is therefore important to store waste rock high and dry and not to use it for structures such as dams or roads since spent ore samples (leach tailings) are regarded as

potentially acid generating. What maintenance is planned for the collection system? Ice and snow removal is necessary prior to runoff so ditches perform to the design capacity. Even if they were designed to handle a 1 in 200 year 24 hour storm event, without ice and snow removal to prevent build up, the design capacity may not even be able handle a 1 in 10 year event (Price, 2005).

YZC Response:

Details pertaining to the storage of waste rock in the tailings facility and diversion ditch design are contained in Section 7. Waste rock materials will not be exposed during operations or at closure.

10.2.8 Water Treatment Plant - Selenium

- Intensive research during the 1980's shows that Se is one of the most toxic elements to fish and wildlife and exhibits a high potential for bioaccumulation through food chains (Outridge et al 1999). Se deriving from the fly ash lagoons of a coal-fired power generating plant contaminated Belews Lake, causing elevated rates of deformities in fish and the eventual disappearance of most fish species within a few years of the opening of the plant (Lemly 1985). The release of selenium into the environment can have a negative impact on fish, wildlife and waterfowl. The potential hazards on Canadian water birds have been overlooked to date.
- Within the October 20th Inspection report prepared by the Yukon Government Water Inspector 5000 L of water with elevated levels of Se and ammonia (NH₃) were discharged into the environment. This discharge has great implications and having uneducated staff personnel on site is an unacceptable excuse. It is the responsibility of the proponent to provide proper training to there employees. One would expect that the environmental impacts associated with mining would be considered when developing a training regime.

YZC Response:

See Section 9.4 for water quality treatment plans with respect to contaminants of concern, including Se. Selenium was previously identified as a contaminant of concern in the EAR Sections 2.8, 2.9 and 7.5. The October 20th inspection report stated that there was a miscommunication between mine staff resulting from an earlier verbal inspector's authorization, and was not the result of uneducated staff.

10.2.9 Water Treatment Plant Sludge

- The primary component of water treatment is lime. Lime sludge containing precipitated metals which is toxic will remain on site once mine operations cease. Best case scenario: a mine life of 12 years, such as Yukon Zinc, produces 12 years worth of tailings, and 9 additional years for ARD treatment is frequently necessary. Essentially there could be 21 years of sludge requiring treatment.

Recommendation

The company must develop mitigation practices to deal with the lime sludge that is left over.

YZC Response:

Details pertaining to water treatment and sludge disposal are documented in Section 9.4. Sludge will be disposed of periodically throughout the operation and closure periods within the tailings facility, and off site at the end of closure if necessary.

10.3 Biophysical Components

10.3.1 Climate Project Effects

- The proponent states that the project will have very little effect on wind direction and velocity. Site clearing will almost certainly lead to increased wind velocity. This may cause an increase of unnecessary blow-down, if tree removal is not done right.

Recommendation

The frequency for the VECC to occur should be rated as high not moderate, as wind distribution in the Yukon is not limited seasonally. With increased wind velocity, wind energy should be considered a form of power on site.

YZC Response:

Strong winds over open areas are not uncommon in this sub-alpine pass area (See EAR Executive Summary, Figure 1). Effects on wind and blow-down due to project-related clearing are not expected to result in a significant change in local wind conditions. Wind power is not a feasible or reliable form of power for this project.

10.3.2 Cumulative Climate Effects

- YCS does not have the same opinion as the proponent. Cumulative effects on the climate have the potential to arise due to mine development. Site clearing can lead to soil degradation, erosion and leaching of nutrients, and may therefore reduce the subsequent ability of the ecosystem to act as a carbon sink (Taylor and Lloyd, 1992). In addition, tree removal will allow the permafrost to thaw emitting methane. Methane, a pollutant from greenhouse gas emissions causing climate change, is 20 times more destructive than carbon dioxide (CO₂). Ecosystem conservation and management practices can restore, maintain and enlarge carbon stocks.

YZC Response:

Refer to EAR Section 6.5 for clarification on how cumulative effects have been defined and assessed for this project. The contribution of GHG emissions was assessed in EAR Section 7.2. As stated in the EAR, the science of climate change has not been advanced to the point where a clear cause-and-effect relationship can be established between the specific or even provincial/territorial and national emissions and subtle change in global climate.

Tree clearing during project development is limited to the subalpine areas along the road route. During geotechnical investigations within the project area in 2005, permafrost was not encountered (see Section 3.2). Most of the project is located on south facing slopes.

10.3.3 Air Quality Project Effects

- The application of dust suppressant could potentially cause environmental impacts including: surface and groundwater quality deterioration; soil contamination; toxicity of soil and water biota; toxicity to humans during and after application; air pollution from volatile dust suppressant components; accumulation in soils; changes in hydrologic characteristics of the soils; and impacts on native flora and fauna populations. Dust suppressants are also the suggested mitigation during decommissioning. Scientific review of these suppressants should be done. The exact suppressant being used should be provided along with the valued ecosystem and cultural component (VECC) associated, if any.

YZC Response:

Water will generally be used for dust suppression. If chemical dust suppressants are required, consideration will be given to the risk of toxic effects in the receiving environment, and appropriate suppressants will be selected in keeping with regulatory requirements.

10.3.4 Operations

- The dust emissions on the road from ore trucks should have been considered in the mitigation practices since emissions may be more extreme than presented in the EAR. With travel out two times a day and under dry conditions the dust emissions can be more fugitive than reported. Energy efficiency measures should be considered more seriously and not be entirely based on economic viability.

YZC Response:

Please see response to comment on Section 10.3.3. Energy efficiency is a driving factor for project design and management.

10.3.5 Residual Project Effects and Significance

- As per personal communication with Mary Gamberg (2005), native plant species will in fact have detectable levels of contaminants after one growing season. Air emissions with greater particulate matter have a greater effect on the plants than those with less particulate matter. The plant species and surface area also play a role in the amount of impact seen. For example, lichens such as *Cladina* will absorb air emissions over their entire surface area.

Recommendation

YCS requests that further information be provided to explain their suggestion that “even subtle effects on the most sensitive receptors, native vegetation in close proximity to the emissions, are expected to be virtually undetectable in as little as one growing season.” In addition, YCS would like the proponent to improve mitigation practices regarding air emissions, and increase their knowledge base on the impacts air emissions can have on Yukon flora.

YZC Response:

Yukon Zinc based these conclusions, respecting the effect of sulphur dioxide on vegetation on Legge (1995), which defines limits below which injury to leaf tissue in sensitive species, is not possible. It was estimated that the maximum 1-hour average

concentration of sulphur dioxide fell well below the most stringent limits suggested by Legge. This applies to Yukon flora.

10.3.6 Terrain, Surficial Geology and Soils

- The large percentage of high erosion potential within the mine's operating area is of concern to YCS. For the reason that the area is problematic throughout all project phases it is suggested that Soil Bioengineering techniques be considered for erosion prevention. In addition, these techniques can be used as a form of progressive reclamation. With the possibility of slides and instability there is great concern for the receiving environment, as a variety of infrastructures can cause environmental impacts if damaged. Furthermore, both the mine and the proposed road are in proximity to riparian areas and water bodies, which must be protected from erosion and deleterious substances. For example: The diesel fuel storage, waste rock pad and sump, and discharge lines may be affected by slumping. The water treatment facility, portal entrance, and tailings/reclaim and sludge discharge pipeline may potentially be affected by slides. The unstable slopes could potentially affect the tailings facility. Excess debris from slides could cause the tailings to displace of outside of the pond, or in an extreme case, break the dams.

YZC Response:

Please refer to EAR Section 3.4 for site Decommissioning and Closure Activities, including EAR Section 3.4.5 related to progressive reclamation. Also refer to EAR Section 9.2.2.5 for general sediment and erosion control measures. Detailed erosion control plans with schematics and site specific applications as appropriate (e.g., stream crossings) will be prepared for construction and operations. Bio-engineering techniques will be considered for use where appropriate. Section 7.7 covers the assessment and design of the tailings facility, including a slope stability analysis.

10.3.7 Surficial Materials Construction

- The exact placement of the topsoil stockpile is not described. It is important to keep records of the top soil as well as to pick the best place for runoff and prevent contamination.

YZC Response:

Stockpile locations were shown in EAR Figures 2.1-1, 2.1-2, 2.1-3, and 2.1-4 and have been updated as shown in Figures 1-1 and 1-2.

10.3.8 Permafrost

- The accuracy of underlain permafrost within the LSA is important and should be looked at more intensely. There are a variety of concerns that arise with permafrost and it is important that the proponent know with certainty what potential impacts the mine can cause. YCS suggests that more detailed work be done in order to determine, with accuracy, the amount of underlain permafrost there is within the LSA. The purposed mitigation measures to deal with permafrost are not comprehensive. The proponent identifies "employing adaptive management techniques" as well as "special construction and operation techniques." Because the effects on the terrain, surficial materials and soils are expected to be the greatest during construction the proponent must explain further what these mitigation measures entail. YCS would

like to see the removal or compression of insulating organic cover prevented. Examples from previous Yukon mines should be integrated into the adaptive management techniques.

YZC Response:

Details with respect to permafrost and mitigation plans are contained in Section 3.2.

10.3.9 Soil Erosion

- The mitigation measures for soil erosion following disturbances during all project phases includes sites are cleaned up when no longer in use. YCS would like a more defined timeline for clean-up to prevent soil erosion. In addition, we would like to see Soil Bioengineering techniques incorporated into the mitigation measures.

YZC Response:

Please see response to Section 10.3.6 above.

10.3.10 Natural Terrain Hazards

- The mapping component combined with pre-site inspections is stated to allow for avoidance of unstable or potentially unstable sites. However, a previous statement in the EAR (pg 7-55) contradicts the mapping component:

“...the inherent nature of 1:30,000 to 1:40,000 mapping does not allow any detailed statements or predictions to be made regarding terrain stability with any degree of confidence.” Will the stability be determined by an inaccurate system? YCS recommends a better system be developed. Once there is a higher degree of confidence in the predictions then construction can continue.

YZC Response:

The bio-terrain mapping at 1:40,000 was used to generally describe soils and terrain in the project area and develop the Terrestrial Ecosystem mapping used for assessing effects on vegetation and wildlife. The terrain stability rating system adopted for this specific project was taken directly from Mapping and Assessing Terrain Stability Guidebook (BC Ministry of Forests 1998). This system uses a two-tiered approach, the first being a reconnaissance assessment using a three class system of stable, potentially unstable and unstable and a second system that employs a more detailed five class system. Because of the scale of the mapping, the reconnaissance method was employed. The 1:40,000 scale mapping allows interpretation of potentially sensitive units with respect to soil erodability and terrain hazards. These maps can be used to flag potentially sensitive areas for general planning purposes. However, siting and design of project facilities requires detailed site specific geotechnical investigations to protect investment and ensure safe and stable project operations. Please see response to Section 10.3.6, above, and Section 7 for tailings facility details.

10.3.11 Decommissioning - Permafrost

- It is impossible to return the permafrost in the LSA to pre-disturbance conditions. Surface conditions can be returned to pre-disturbance conditions, but once the permafrost or perennially frozen ground is disturbed it is discontinuous and may take up to two years under ideal conditions to return to its previous states. Discontinuous

is regarded as the most sensitive to disruption (EBA 2004). Removal or compression of insulating organic cover should be prevented. Within the *Permafrost considerations for effective mine site development in the Yukon Territory* by EBA (2004) there are a variety of measures to prevent the thawing of permafrost including roads and airstrips. These must be included in the mitigation measures.

YZC Response:

Details are provided in Section 3.2.

10.3.12 Surface Water Hydrology - Project Effects - Mine Dewatering Affecting Flows in Wolverine and Go Creeks

- Measurable flow reductions in Wolverine Creek (40-50%) will not be limited primarily to the mine operation. Full restoration of the groundwater table above the mine will take approximately sixteen years after mine closure. Therefore, the reduction of the Wolverine basin will ultimately have long-term effects on both Little Wolverine and Wolverine Lakes.
- In addition, EAR Section 7.5.4.1 discusses the concentration of fish at the mouth of the stream where it discharges to Little Wolverine Lake. The effect of flow reduction on fish and fish habitat has not been adequately addressed. There are many aspects that need to be considered such as season, whether the stream is gaining or losing and whether it is naturally intermittent.
- The proponent states that the Wolverine Creek basin has already been affected by access road construction, mine portal construction and pre-production. The additional pressure on the basin by dewatering it is not addressed in the EAR.

YZC Response:

An assessment of potential flow reduction in Wolverine Creek is provided in Section 6.4. No impacts are anticipated to Little Wolverine Lake or Wolverine Lake due to the vast size of the watershed of the lakes compared to the small creek.

10.3.13 Go Creek

- Water will be diverted and reduce flows in Go Creek by a rate of 0.056 m³/s. If the water is not above 350 m³/hr during May, June and July, the anticipated diversion months where will the necessary water be removed from?

YZC Response:

Diversion of the Go Creek into the tailings facility is proposed only at the start up of the mill as detailed in Sections 7.6 and 7.9.

10.3.14 Residual Project Effects

- Although effects on Wolverine Creek and the aquatic habitat within that reach are reversible with restoration of the ground water, it will not occur for another 16 years and therefore should not be considered “not significant”. The absence of aquatic invertebrates from an ecosystem for extended periods of time is detrimental to the area. They play a significant role in the food web and may potentially cause cumulative effects on fish and wildlife populations.

YZC Response:

Aquatic invertebrates do play a vital role to sustainability of fish stocks in any watercourse. Wolverine Creek is a small (0.3 m channel width), likely ephemeral (subsurface in upper reaches) creek that contributes 0.8% to the total watershed area of Little Wolverine Lake and likely does not support a substantial benthic invertebrate community. Due to its ephemeral nature, steep gradient throughout (>30%), and high probability of substrate-to-surface freeze-up during most of the year, Wolverine Creek supports low fish habitat values with limited productive capacity. One juvenile lake trout, captured near the Wolverine Lake confluence confirms very limited fish use of the lower creek. Fish presence in lower Wolverine Creek most likely represents opportunistic forage opportunities by juvenile fish otherwise associated with lacustrine littoral habitats afforded in abundance around Little Wolverine Lake.

10.3.15 Surface Water and Sediment Quality

- Erosion related to the new road could be an issue. Development of ditches and culverts should consider the high waters. Proper construction is necessary to reduce the likelihood that drainages or culverts will become blocked. Flooding and/or blockage will increase sedimentation in the water which has adverse effects on fish and aquatic species. It is imperative that extreme care is taken to ensure that the total suspended solids don't increase with development.

YZC Response:

Road construction including ditching and culvert installation will adhere to erosion and sediment control measures detailed in the EAR Environmental Protection Plan (EAR Sections 9.2.2.2 through 9.2.2.4). Further details and site specific mitigation measures will be detailed in field manuals for construction, as part of the mine permitting process. Water quality monitoring will be conducted as required by mine permitting for construction to ensure effectiveness of mitigation measures and take remedial actions as necessary (EAR Section 9.2.2.1).

10.3.16 Results - Cadmium (Cd)

- Increased concentrations of Cd in benthic invertebrates have been found to cause rainbow and brown trout to experience increased mortality, reduced growth, reduced feeding activity, and histopathological abnormalities (Saiki et al. 2001). It is expected that water bodies within a mineral rich area would have higher levels of minerals than those recommended in the CCME guidelines. However, increased elevated levels with discharge are not acceptable. What is the process of determining the appropriate amount of discharge? This must be answered before the project gets approved.

YZC Response:

Site specific water quality criteria (including cadmium) will be developed for the Go Creek watershed as outlined in Section 9.1. Type A CCME recommendations for the site specific water quality criteria will determine the water treatment plant standards and discharge volumes required to ensure that the site specific water quality criteria are met in the receiving waters.

10.3.17 Wolverine Lake

- Important fish populations and habitat could be adversely affected not only by the water quality but by the quantity.

YZC Response:

An effects assessment with respect to Wolverine Creek is provided in Section 6.4.10.

10.3.18 Construction-Wolverine Creek

- Ice and snow removal is necessary prior to runoff so ditches perform to the design capacity.

YZC Response:

Ditch design has incorporated the necessary criteria to ensure adequate performance (see Sections 1.2 and 7). Snow and ice removal will be conducted as necessary.

10.3.19 Mitigation Measures for Effects on Water and Sediment Quality

- The removal of vegetation and soil disturbance within a Riparian Management Area (RMA) is inappropriate. YCS suggest that as stated in Section 7.5.4.1, clearing beside a stream should be avoided to provide intact riparian buffer zones. Monitoring should be done by a third party environmental and rehabilitation service. Soil Bioengineering techniques, such as those developed by Polster Environmental Services, should be incorporated to ensure stream bank/slope stability. Revegetation, reseeded and recontouring of disturbed areas should be monitored to ensure productivity. The urgency for restoration of sites should not compromise the quality of work performed. Present mitigation measures provided by the proponent are insufficient regarding elevated levels of Cd, Se and Zn. The changes in water quality regarding Cd, Se and Zn are not addressed until mine closure.

YZC Response:

As noted in the EAR (Table 7.8-9), YZC will avoid clearing of riparian vegetation wherever possible and provide erosion control and reclamation to sustain cover and prevent introduction of sediments to streams (Please also refer to response to Section 10.3.6, above). All construction sites will be monitored as documented in EAR Section 9.2. Water quality and treatment for both operations and closure were provided in the EAR (Section 7.5) and have been revised in this report (Section 9).

10.3.20 Closure - Treatment Plant Effluent – Go Creek

- Elevated levels of Cd, Se and NH₃ in Go Creek for a distance of 7 km downstream of discharge point is unacceptable as this will almost certainly kill all life in this reach of the stream. The proponent predicts no adverse effects downstream in fish-bearing waters, is their solution to pollution dilution? A better treatment facility is required to minimize elevated levels of Cd, Se and NH₄.

YZC Response:

Mine effluent will be treated during operations to ensure compliance with site specific water quality criteria in Go Creek (See response to comments on Section 10.3.16 above). Most metals in the effluent will meet CCME guidelines immediately downstream of the discharge point at all times. A combination of effluent treatment and dilution (in the

effluent dilution zones as defined by the Metal Mine Effluent Regulations) is used to reduce remaining constituent concentrations to receiving water criteria at the established compliance point. See Section 9.1 for additional information.

10.3.21 Groundwater Discharge – Wolverine Creek at Closure

- The EAR states that effects might not be noticeable for up to 52 years. Under the new *Reclamation and Closure Policy for Yukon Mines* the proponent will be responsible for the mine and any potential effects that arise now or in the distant future.

YZC Response:

Refer to Section 6.4 for an updated assessment of the effects in Wolverine Creek at closure. Closure plans will be updated as required under the License conditions and the new policy requirements will be incorporated.

Cumulative Effects and Significance

- Rating the potential effects of metal inputs from groundwater recharge into the Wolverine basin as “not significant” is deplorable. Dolly Varden and bull trout have been designated as “sensitive” therefore it is imperative that a significant rating be considered. All aspects of their life cycles must be considered when adding and removing water from these creeks.

YZC Response:

Bull trout were not captured from Wolverine Creek. All lake-accessible fish habitat in Wolverine Creek was sampled for fish presence (electrofished) and only one juvenile lake trout was captured near the Little Wolverine Lake confluence. This single capture is indicative of very limited fish habitat capacity and likely represents opportunistic feeding forage into lower Wolverine Creek as opposed to sustained use (See Section 10.3.12 above).

Construction

- Dewatering will almost certainly have an effect on benthic periphyton and invertebrate communities. Wetzel (1983) states that changes in the substratum and overlying water strongly influence the distribution and diversity. The effect therefore will ultimately affect fish and wildlife. Construction activities for stream crossing are contradicting earlier statements within the EAR regarding riparian zones. Section 10.3.18, clearing beside a stream should be avoided to provide intact riparian buffer zones.

YZC Response:

No dewatering of surface waterbodies is proposed. Mine dewatering may result in a 25% reduction in winter low flows, and a 4% reduction in average summer flows (see Section 6.4.9). As noted above and in the EAR (Table 7.8-9), YZC will avoid clearing of riparian vegetation wherever possible and provide erosion control and reclamation to sustain cover and prevent introduction of sediments to streams (Please also refer to response to Section 10.3.15). Culvert installation and ditching activities will adhere to a detailed EAR Environment Protection Plan (Sections 9.2.2.2 through 9.2.2.4).

10.3.22 Tributaries along the Access Road

- YCS suggests that hauling trucks be rinsed of debris before leaving the mine site with ore and after is has unloaded ore to prevent metals, hydrocarbons and sediment from entering the tributaries along the access road.

YZC Response:

A vehicle wash station has been incorporated into the Industrial Complex (Figure 1-4 provides the water volume estimate).

10.3.23 Construction

- YCS disputes the statement that “riparian vegetation loss or alteration will have minimal effect on fish resources.” In fact the loss of riparian vegetation can be detrimental to fish resources. Cover is necessary for fish since it provides cool waters and a safe haven from predators. A stream lacking in cover generally lacks in fish as the temperatures are too high and the risk of predation is great.

YZC Response:

YCS has taken the statement out of context, i.e., effects will be minimal because there will be minimal loss or alteration of riparian vegetation by following the mitigation measures described in EAR Table 7.8-9 and the Environmental Protection Plan (EAR Section 9.2).

As noted above and in the EAR (Table 7.8-9), Yukon Zinc will avoid clearing of riparian vegetation wherever possible and provide erosion control and reclamation to sustain cover and prevent introduction of sediments to streams (Please also refer to response to Section 10.3.6, above).

10.3.24 Mitigation Measures for Effects on the Fish Resources

- Monitoring should be included as a mitigation measure. The restoration of a site must be monitored long after the initial seeding to ensure root development. Screen bypass and water intake pumps must be monitored to ensure fish are not be harmed in any matter. Water velocity must be determined so not to have fish impinged on the screen. If the velocity exceeds this rate at the screen, stake the screen further away from the pump intake to expand the area of coverage and lower the velocity rate.
- There has been no discussion on the type of screen to be used. There are a variety of types, such as a uniform flow velocity cap intake (UFVCI). The UFVCI was developed to protect power plant cooling water intakes. Essentially, the UFVCI is an intake drain submerged just above the floor of the water source. The cap is circular when viewed from above, and T-shaped in vertical section (see diagram below). The intake cap creates a uniform velocity of water flowing horizontally into the pipe, which is less likely to attract fish to the intake. A horizontal flow is easier for fish to negotiate around than a vertical flow. Juveniles tend to migrate close to shore and near the surface. If possible locate intakes deep and as far out into the water source as possible to avoid attracting juveniles. Monitoring of culverts and bridges must continue for the mine-life to maintain slope and bank stability. The presence of an on-site monitor (environmental inspector) during the mine site development should be included in the mitigation measures.

YZC Response:

As noted on EAR Figure 7.8-1 there are no fish in the vicinity of stream crossings with the exception of Light Creek and Bunker Creek, where fish presence has only been confirmed downstream of the crossing, in spite of comprehensive surveying of upstream reaches. In these streams, fish salvage and site isolation using nets will be done prior to culvert installation. Pump intakes for diversions will be screened in accordance with Freshwater Intake End-of-Pipe Fish Screening Guidelines (Fisheries and Oceans Canada 1995). Accordingly, impingement of fish on pump intakes is not anticipated.

Monitoring has been included as a mitigation measure. Please see EAR Table 7.8-10 for monitoring including erosion control during construction and reclamation effectiveness. Please see EAR Section 9.2.2.1 for project environmental management responsibilities including an on-site monitor.

10.3.25 Vegetation

10.3.25.1 General Comments

The proposed project is in the middle of the Frances Lake Unit of the Kaska Forest Resources Stewardship Council Regional Forest Management Plan Framework. This area is proposed to be deferred from logging, with only small volume permits being allocated for building logs or timber for cabins.

Recommendation:

Communicate with the Chair of the Kaska Forest Resources Stewardship Council to ensure that there is integration between the Wolverine Mine Project and the integrated resource management planning that the Kaska Forest Resources Stewardship Council is currently completing.

YZC Response:

YZC routinely consults with the Ross River Dena Council. The forest resource is limited near the mine site due to its location near the valley bottom. Approximately one third of the road route has harvestable trees. In partnership with the RRDC, YZC will ensure that these trees are removed following consult with the KFRSC.

10.3.25.2 Scope of Assessment

- It is stated that the key issue for project effects on vegetation is “change in the abundance, distribution or health of plants or plant communities.” This is a narrow view of the potential effect of the project. Even if the project does not result in any significant change in the abundance, distribution and health of plants or plant communities, if wildlife are not using areas they would normally use for foraging or hiding cover or for various parts of their life cycle, i.e. calving, rutting etc. then the vegetation is not able to maintain it’s role in the ecosystem.

Recommendation:

Expand the definition of the key issue for project affects on vegetation to include reference to the ability of animals to use the vegetation for what they need. Suggested wording: “The key issue for project effects on vegetation is the change in abundance, distribution or health of plants and plant communities and/or the ability of animals to use the vegetation for what they need, i.e. foraging, hiding, rutting”.

YZC Response:

No change to the key issues for vegetation are required to address the connection to wildlife habitat requirements because this linkage is implicit in the terrestrial ecosystem mapping (TEM) protocol used as a basis for the assessment. TEM was used to both characterize the vegetation in the study area and develop the wildlife habitat suitability models. Ecosystems were classified and mapped by a vegetation ecologist based on vegetation as per Zoladeski and Cowell and rated for habitat suitability for each wildlife VECC by a wildlife biologist. Wildlife ratings for each polygon were subsequently used as the basis for the assessment of effects on wildlife.

10.3.25.3 Mitigation Measures

- Changes in composition/structure of uncommon communities due to increased windthrow at edges – suggested change for the third mitigative measure: where no natural windfirm features are available, widen the management zone.
- Introduction of invasive species – suggested change for the sixth mitigative measure: follow best management practices for reclamation, using local seed. Seed collection should begin with enough lead time to reclaim all areas using local seed.
- Indirect loss of mature and old forests due to windthrow at edges:- suggested change for third mitigative measure – where no natural windfirm features are available, widen the management zone.
- Loss of wetlands and riparian vegetation communities due to clearing and construction.
- Suggested change: design roads so as to avoid the greatest area of wetlands/riparian vegetation.
- Suggested change for additional bullet: in situations where wetlands and riparian ecosystems cannot be avoided, build low wooden or composite removable decks that allow the trucks to drive over wetlands without disturbing the vegetation. In winter, ice/snow bridges, only using snow can be used.
- Suggested change for additional bullet: design roads in the riparian forest in consultation with the Kaska Forest Resources Stewardship Council, or relevant body, so as to coordinate access for small scale timber permits if the timber type is appropriate.
- Trees felled for this mine that are of the right quality should be allocated in a small timber permit for house logs as per zoning recommendations in the Frances Lake Unit in the Kaska Forest Resources Stewardship Council Forest Management Plan framework should be made available for this use.
- Additional Project Effect: Loss of forest cover, leading to melting of permafrost. Suggested mitigation measure: Avoid road building or construction of any kind on areas underlain by discontinuous/continuous permafrost, or in areas that are adjacent to areas underlain by permafrost.

YZC Response:

With respect to suggested changes to mitigation measures for vegetation, as noted in EAR Section 9.1, detailed versions of the protection plan outlines provided in the EAR will be

developed in conjunction with detailed project design and permitting. The refinements suggested by YCS will be integrated in those detailed plans.

With respect to coordination of timber harvest and salvage with the Kaska Forest Resources Stewardship Council, please see response to Section 10.3.25.1, above.

With respect to avoidance and mitigation of effects on permafrost, refer to Section 3.2.

10.3.26 Wildlife

- General comments are related to the longevity of this project and the inability to predict the impacts significant or otherwise on important wildlife. The designation by Species at Risk Act (SARA) and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) of species within the mine's footprint is not being adequately addressed, not to mention the number of species used for subsistence living and the importance of their roles. Undoubtedly, if prices remain high, it will be sixteen years before the habitat can begin to revive to its "pre-mining" form. Long term wildlife population trends at previous large scale land disturbances, such as mine sites, should be analyzed for potential management plans. At present wildlife's quality is being questioned around previous mine sites, and subsistence living is being jeopardized by inadequate mine operations. The Northern Contaminants Committee should be approached. Their expertise can provide direction and guidance towards a management approach that is acceptable and practical. What is Yukon Zinc doing to ease the levels of concern about potential mortalities and/or extirpation of a designated "sensitive" species such as bull trout, grizzly bears and caribou?

YZC Response:

In the EAR, YZC conducted an assessment of project effects on caribou and grizzly bears that addressed concerns of potential mortality and/or extirpation of these species. The assessment notes that some project effects will be unavoidable, to some degree. However, project effects were determined to be not significant and are therefore not predicted to result in the extirpation of either grizzly bears or caribou within the project area. To reduce potential project effects, mitigation strategies have been developed specifically for grizzly bears and caribou (see Wildlife Protection Plan (WPP), EAR Section 9.5). Mitigation strategies for these and other species include the following:

"A set of restrictions for wildlife protection will be the basis for the WPP. These restrictions are directed at minimizing the potential for adverse project-related effects (e.g., increased mortality risk) on wildlife in and around the project site. Project workers, managers, contractors, and guests that violate any of these restrictions will be subject to disciplinary action.

The restrictions include, but are not limited to, the following:

- Firearms are not permitted at all times on or in the vicinity of the project site, including during travel to and from the site.
- Feeding wildlife is prohibited at all times on or in the vicinity of the project site, including during travel to and from the site.
- Harassment of wildlife is prohibited at all times on or in the vicinity of the project site, including during travel to and from the site.

- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows, and the like, is prohibited at all times on or in the vicinity of the project site, including travel to and from the site.
- Hunting and fishing is prohibited at all times on or in the vicinity of the project site, including during travel to and from the site. This restriction is applicable to all mine employees, managers and contractors. It will be in effect throughout the life of the project from construction through to closure. Infringement of this policy is to be reported.
- Pets are prohibited at all times on or in the vicinity of the project.
- Maximum speed limit on all access roads is 60 km/h.
- Access and use of ATVs and snowmobiles for recreational purposes on the mine haul road and the mine site will be prohibited. All traffic will be restricted to designated access roads and trails.”

In addition to these restrictions, other mitigation approaches are outlined in the WPP for: problem wildlife (EAR Section 9.5.1), bears (EAR Section 9.5.2), wildlife and vehicles (EAR Section 9.5.3), habitat management and wildlife harassment (EAR Section 9.5.4), and wildlife health (EAR Section 9.5.5). A wildlife reporting and monitoring plan is also provided.

Project facilities at the industrial complex and the access road will not impinge directly on confirmed bull trout habitat. Bull trout were observed downstream of the proposed access road crossing in Bunker Creek, but no effects on habitat are anticipated from road crossing construction.

Water treatment plant discharge standards have been designed so that stream water quality (TSS, metals, pH, ammonia) will meet CCME objectives for protection of aquatic life at the upstream limit of fish distribution in Go Creek (2 km upstream of the confluence with Money Creek). Concentrations of some metals are expected to slightly exceed CCME objectives in the upper reaches; however, baseline levels are also observed to exceed guideline concentrations on occasion. The Guidelines are set conservatively low to ensure no harmful affect on aquatic organisms.

10.3.26.1 Caribou

Caribou Habitat Availability

- A large amount of time and money has been spent on caribou herds and the removal of there habitat is a sensitive issue. A decrease of 1.8% is significant if the decrease comes from the area deemed most suitable as habitat. If this is the case, it should be considered as a significant impact that may not be reversible. Even if this is not the case, impacts on populations may not reversible and can cause a further decrease in an already low population.
- More importantly, the confirmed habitat loss within the local study area (LSA) only includes that within the study area. It is well documented that disturbances have a much larger footprint on caribou that the disturbed area itself. Fragmentation of caribou habitat creates impacts on the herd that go far beyond the actual disturbance.

YZC Response:

Winter habitat appears to be most limiting factor, in terms of habitat availability, for the Finlayson caribou herd (FCH). Availability of winter habitat is thought to be strongly related to localized snow conditions that occur on traditional wintering range for the FCH (Farnell, 2005, pers. comm.). However, the proposed project is not predicted to affect the availability of the most suitable and known wintering area that occurs north of the project area (see Figure 4.1 for caribou locations for the Finlayson herd between 1982 and 2004). This assessment included potential effects of sensory disturbance (i.e., effects that extend beyond the direct habitat clearing) and effects of habitat fragmentation. As noted in EAR Section 7.10.4.1, these effects were found to be low in magnitude.

Mortality Risk

- With regards to wildlife access is of utmost concern to YCS. Although there will be a locked gate, presumably at the Robert Campbell Highway, it will not prevent individuals from entering the mines property using ATV's, snowmobiles, etc. An additional gate should be located farther up the road. In addition, there will have to be personnel monitoring the gate and road at all times in order to protect the well being of the herd. Potential impacts to the caribou herd need to be discussed with the Ross River First Nation, Liard First Nation, and the Liard regional biologist. They also need to be discussed with the Kaska First Nation Forest Resources Stewardship Council, which is doing integrated resource planning for the region.

YZC Response:

Increased access, and related mortality risk for the FCH, was acknowledged as a key issue in the assessment. Mortality risk specifically resulting from increased access to project area during operations is not expected to not have a significant effect on the FCH for the following reasons:

- The project haul road provides only minor access to the known range of the Finlayson caribou herd and population.
- The density of existing access across the range of this caribou herd is also relatively low. This means that the cumulative access provided across the entire range of the Finlayson caribou herd is relatively minimal.

YZC is committed to minimizing any potential increase in mortality risk to the FCH and other wildlife. The following mitigation measures will be implemented as per the Wildlife Protection Plan (EAR Section 9.5):

- "Access to the mine haul road will be restricted by a locked gated during the construction, operations, and decommissioning phases of the project.
- Firearms are not permitted. This includes the carrying of firearms in private vehicles to and from the project site on workdays.
- Hunting and fishing are prohibited at all times on or in the vicinity of the project site, including travel to and from the project site on workdays. This restriction is applicable to all mine employees, managers and contractors. It will be in effect throughout the life of the project from construction through to closure and reclamation. Infringement of this policy is to be reported.

- Vehicle traffic volumes will not exceed 13 round trips per day on the proposed mine haul road.
- Maximum speed limit on all access roads is set at 60 km/hr”.

The presence of non-mine personnel will be controlled and monitored during the construction, operations, and decommissioning phases of the project. In addition to the locked gate, on-site personnel will report the presence of non-mine vehicles and individuals, including non-mine ATVs and snowmobiles. If the proposed mitigation to prevent access by non-mine individuals is found to be ineffective, further mitigation measures may be taken (e.g., improved gate(s), signage, monitors, etc.)

Yukon Zinc consulted with a number of Territorial biologists in the preparation of the EAR, including the Regional Biologist for the Liard Region (refer to EAR Table 7.10.2). The Chair of the Kaska Forest Stewardship Council was also consulted.

10.3.26.2 Moose

Disruption to Movement Patterns

- There has been a direct concern with the projects fragmentation effects on moose recruitment and over-winter adult survival. Moose are a very important food for First Nations. Significant impacts related to this project are not low in magnitude and may potentially have a large impact on subsistence over the next 16 years, if not longer.

Recommendation

YCS recommends that a more intense study be carried out to fully understand the implications a road and a mine operation will have on moose populations in the area. The First Nation needs to be consulted on this issue. It also needs to be discussed with the Kaska Forest Resources Stewardship Council, which is doing integrated resource planning for the region, and the Liard regional biologist.

YZC Response:

Moose were identified in the EAR as an important wildlife species in the region. Information on movement corridors for moose was provided in EAR Section 7.10.2.2:

“There is little information available regarding moose habitat in the project area. Early-winter surveys conducted in 1996 (Yukon Renewable Resources 1996) for the area indicated that the Kudz ze Kayah project area and subalpine willow zones in the Wolverine, Fire and North lakes regions along Money Creek are important to moose during the post-rut period. Traditional knowledge and local anecdotal observations suggest that the Kudz ze Kayah site and areas between Kudz ze Kayah and the Wolverine project sites are an important seasonal travel corridor for moose. Moose summering in the North Lakes area (southwest of Wolverine Lake) move north through the area between the Kudz ze Kayah and project areas to winter in the lowlands along the Robert Campbell Highway, and return via the same route in the spring.”

Examination of potential effects of habitat fragmentation on movement corridors for moose was provided in EAR Section 7.10.4.2:

“Anecdotal observations suggest that the proposed mine site and road route may interfere with an important seasonal travel corridor for

moose between their winter habitats in lowland areas along the Robert Campbell Highway and upper elevation habitats occurring in spruce, willow, and birch vegetation communities during the spring summer and rutting periods (Ward 2005, pers. comm.). If mine activity interferes with moose moving to and from important rutting and calving areas, or displaces them into wintering areas of lower quality habitat, Environment Yukon suggests this could have significant impacts on moose recruitment and over-winter adult survival (Ward, 2005 pers. com.). The project will have unavoidable and adverse effects on movement patterns by moose in the area. However, these project effects are considered low in magnitude given several mitigation measures that should be implemented during construction, operations and decommissioning phases, including the following:

- Access to the mine haul road will be restricted by a locked gated during the construction, operations, and decommissioning phases of the project.
- Vehicle traffic volumes will not exceed 13 round trips per day on the proposed mine haul road.
- Wildlife has the right-of-way on all roads, except where it is judged to be unsafe to do so.
- Maximum speed limit on all access roads is 60 km/h.
- Incorporate traffic signs for sensitive wildlife areas.
- Conform to road snow clearing requirements at the discretion of the Environmental Superintendent.
- Project-related traffic (including ATVs and snowmobiles) is restricted to designated access roads and trails (with certain exceptions).
- A policy prohibiting recreational use by employees and contractors of all-terrain vehicles and snowmobiles. Access and use of ATVs and snowmobiles for recreational purposes on the mine haul road and the mine site will be prohibited. All traffic will be restricted to designated access roads and trails.”

Although the road is likely to have unavoidable effects on habitat availability (including avoidance), the road is not predicted to present a barrier to movement for moose. The proposed road will have be relatively narrow (less than 35 m cleared right-of-way) and traffic volumes will be relatively low (13 round trips per day).

Yukon Zinc consulted with a number of Territorial biologists in the preparation of the EAR, including the Regional Biologist for the Liard Region (refer to EAR Table 7.10.2). The Chair of the Kaska Forest Stewardship Council was also consulted. YZC has also consulted with the RRDC and Ross River YESAA coordinators on several occasions.

10.3.26.3 Grizzly Bear

- Jalkotzy et al (1997) advocates for open road densities be no higher than 1.0 km per 6.4 km² (0.16 km/km²; 0.25 mi/mi²) for effective grizzly bear recovery and conservation. The review goes on to discuss the loss of grizzly habitat (8.5% of their total study area) as a result of road avoidance

- YCS would like the proponent to incorporate the following when developing the road. In order to effectively protect the wildlife aspects such as road density should be assessed. Road density assessments need to include, not just the proposed mining road and exploration road, but all other roads and trails in the area that can be accessed with vehicles.
- Human/bear conflicts are of concern to YCS and mitigation measures suggested to prevent the human –bear contact should not include the elimination of “problem bears”. The WPP should require that the company provide the full cost of relocation of any “problem bears”.
- YCS encourages the proponent to reduce human bear interaction by eliminating food and chemicals that would be of interest. Road kill should not be a major concern since wildlife has the right of way, signage will be posted in high wildlife areas and the speed limit is 60 km/hr.

YZC Response:

The Jalkotzy et al. (1997) reference identifies a road density threshold of 0.16 km/km² for grizzly bear recovery zones (i.e., specifically Yellowstone National Park, Craighead et al. 1995). The Wolverine Project does not occur in a grizzly bear recovery zone or protected area. Also, this density threshold is based on road density thresholds that range between 0.47 and 0.62 km/km².

The density of roads in the study area is calculated below, including the contribution of the project to the overall road density. There is currently a total of 232.4 km of linear features in the Regional Study Area (RSA) (Table 10-1). The project will incrementally contribute 25.7 km (11%) to the cumulative linear features in the RSA. The area of the RSA is approximately 3000 km²; therefore, the linear disturbance density in the RSA, including the project access road, is 0.047 km/km². This estimate is below the thresholds for grizzly bear recovery noted above (ranging from 0.16 to 0.62 km/km²; Jalkotzy et al. 1997). It is expected that mitigation measures during operations (e.g., gates, no hunting, and controlled access measures) will further minimize effects of this increased access potential on grizzly bears.

Table 10-1 Linear Disturbances in the Wolverine Regional Study Area

Feature Type	Length (km)
Baseline Linear Disturbances	
Bridge	0.52
Drill Road	1.88
Limited-use, cart track, road	2.86
Main Road	8.12
Main, ground level, loose surface, operational road	75.52
Main, hard surface, operational road	0.52
Road	23.54
Secondary, ground level, hard surface, operational road	4.29
Trail	115.18
Project Linear Disturbances	
Ridge Route Road	25.67

As provided in the response to Section 10.3.26, above, the Wildlife Protection Plan provides mitigation strategies for dealing with problem wildlife, including bears. The WPP also specifically states that;

“Any direct intervention with respect to problem wildlife will be conducted by authorized personnel in consultation with, and as approved and/or directed by Environment Yukon officials” (EAR Section 9.5.2.2).

Yukon Zinc will comply with all Environment Yukon regulations for dealing with problem wildlife issues.

10.3.26.4 Beaver

Habitat Availability

- The loss of ~25% of potential beaver habitat affects more than just beavers. Migratory birds depend on the structures to provide habitat for nesting and feeding. Therefore the reduction in potential habitat should not be considered a loss to just one species.
- Beavers are known for their ability to change landscapes, there are no mitigation measures provided for beaver populations that change the mine sites landscape for the worse.

Recommendations

YCS recommends that the proponent research the options for preventing the habituation of beaver colonies in culverts and road beds. Unnecessary mortalities can be prevented through proper management plans.

YZC Response:

A literature review, consultation with experts, and field surveys were conducted to determine the baseline conditions for beaver and results were incorporated in the wetland assessment. As part of the environmental impact assessment process, key species or valued ecosystem and cultural components (VECCs), such as beaver, are selected, with the recognition that they will be representative of potential impacts to other species. Table 10-2 (found in EAR Section 7.10.2.2) acknowledges the concern surrounding the loss of wetland habitats to multiple species.

Table 10-2 Beaver Habitat Overlap with Other Wildlife Species (from L. Foote, 2005)

Wildlife Group	Species	Habitat Association
Mammals	Moose	Forage on aquatic plant species.
	Muskrat	Share habitat and have been known to use beaver lodges in the winter (McKinstry et al. 1990).
	Otter	Positive association with otter numbers and number of beaver flowages (Dubuc et al. 1990).
	Mink	Share similar habitat with beavers.
	Hare	Find cover in willow thickets.
	Lynx	Prey on hare.

**Table 10-2 Beaver Habitat Overlap with Other Wildlife Species
(from L. Foote, 2005) (cont'd)**

Wildlife Group	Species	Habitat Association
Waterfowl	Trumpeter Swans	Are expanding into this area – as beaver ponds provide an increased abundance of suitable habitat.
Fishes	Pike	Use habitat created by beavers.
Invertebrates	Dragonflies	Feeding grounds, ideal habitat for life cycle.

In terms of reductions of habitat availability, the ~25% loss of beaver habitat within the Local Study Area is an over-estimate based on the assumption that all beaver habitat within 50 m of the disturbance footprint would be lost. The disturbance footprint was conservatively defined as the total area of all claims impinged upon by project facilities. In many instances the project facility will occupy only a small fraction of the affected lease area. Wetlands have been avoided during facility and road siting. In addition beaver are adaptable to human disturbance and could be expected to continue to occupy habitats in the vicinity of project facilities. Furthermore, wetland habitat in the Regional Study Area is relatively abundant. On this basis the effect of the projects on wetlands affecting beaver and other wildlife species is not expected to be significant.

Mitigation measures identified in the EAR (Section 7.10.4.5) to reduce potential effects on beaver mortality, habitat availability and movement patterns include:

- Restricting use of machinery and vehicles in beaver wetlands and surrounding riparian areas.
- Facility site and road routing attempts to avoid wetland habitats as much as possible due to engineering design and cost considerations.
- Road widths and adjacent land clearing are not likely to exceed widths of 20m in proximity to wetland areas.
- Vehicle traffic volumes will not exceed 13 round trips per day on the proposed mine haul road.

Where appropriate, the use of beaver exclusions techniques at stream crossings may be implemented as an additional mitigation strategy.

10.3.26.5 Lynx and Snowshoe Hare

Mortality Risk

- YCS suggest that an educational program be developed within the communities to identify the impacts increased trapping will have on lynx during the low population cycle. In addition addressing the access issues for all wildlife species is recommended. We suggest providing funding to the Kaska First Nations to develop a wildlife plan to deal with impacts of this mine. This plan might include a voluntary hunting and trapping moratorium in the area opened up by the access for this mine.

YZC Response:

Yukon Zinc agrees that both hunting and trapping restrictions during sensitive periods of life history cycles for certain wildlife species (e.g., lynx) may be warranted. For this

reason the WPP includes the following restrictions during the construction, operations, and decommissioning phases of the project (EAR Section 9.5.2.1):

- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows, and the like, is prohibited at all times on or in the vicinity of the project site, including travel to and from the site.
- Hunting and fishing is prohibited at all times on or in the vicinity of the project site, including during travel to and from the site. This restriction is applicable to all mine employees, managers and contractors. It will be in effect throughout the life of the project from construction through to closure. Infringement of this policy is to be reported.
- Firearms are not permitted at all times on or in the vicinity of the project site, including during travel to and from the site.

Increased hunting or trapping pressure is not expected to result from the project during construction, operations and decommissioning.

10.3.26.6 American Marten

Habitat Availability

- The Highland Boreal forest type found within the LSA as well as outside could potentially be martin habitat. Although it may not be the ideal habitat, it may be sufficient for that area. In other words, if they have nothing better to choose from it will be used. The inclusion of a forest age stand map would be useful with relationship to forest cover and wildlife habitat requirements.
- Leaving slash piles for marten habitat can also be detrimental to their populations. Slash piles may serve as winter resting sites and/or maternal dens and the burning of piles may cause mortality. A mitigation plan to prevent unnecessary mortality to animals nesting and/or denning in the slash piles must be addressed. For example, burning of slash piles is not permitted once designated for wildlife habitat.

YZC Response:

YZC agrees with the above comments on American marten.

Forest cover mapping (with forest age attribute data) in the project area is limited, likely because there are few forested stands in the area. An ecosystem mapping approach was conducted as part of the EAR, where most of these forested stands have been identified and are conservatively presumed to provide potential marten habitat.

Slash piles will be managed to minimize any adverse effects on wildlife. Slash piles will not be left on site with the intent to attract marten to the development area. The prompt and opportune removal of slash piles will therefore be encouraged. In the event slash piles are left on site, they will be checked for indications of habitat use before removal, with the objective of avoiding wildlife mortality.

10.3.26.7 Trumpeter Swan

Habitat Availability

- Mitigation practices recommended include discouraging people from disembarking near nesting wetlands. Considering a great number of wetlands will be embarked

upon by the proponent's construction and operation phases it is unlikely that there will be any trumpeter swans left in the wetlands. YCS discourages the proponent from disembarking on (disturbing) the nesting wetlands!

YZC Response:

From existing information, no known trumpeter swan breeding habitats were identified to occur within the LSA. However, this absence is likely a result of few previous surveys in the project area. During field surveys (aerial wetland surveys and ecosystem mapping surveys) for this project, one pair of breeding trumpeter swans was confirmed within a wetland in the LSA (on two occasions). This breeding habitat occurs greater than 500 m from proposed project development. As such, project effects, including construction activities, are not predicted to affect trumpeter swans. Should more trumpeter swans be observed in the project area, mitigation measures for protection of wetlands (EAR Section 7.10.4.5) and swan breeding wetlands (EAR Section 7.10.4.9) are applicable.

10.3.26.8 Non-traditional Hunting, Guide Outfitting and Trapping

- YCS disagrees with the proponent's statement: "The presence of the mine access road will not enhance opportunities for hunting or outfitting during operations." Access will almost certainly lead to increased hunting, which will impact wildlife populations and therefore affect hunting and trapping in the area.
- Access to snowmobiles and ATVs will increase pressure on the wildlife. Animals not accustomed to traffic/noise will scare easily and vacate the area. The vacating of animals from their winter range is very energy expensive and can cause unnecessary mortality.
- Guide concessions will almost certainly be affected by the mine operations. Wildlife does not stand to gain from the enhanced access as proposed by the proponent. Also the wilderness esthetics, which are important to guides and outfitters' clientele will be impacted. The proposed project will have socioeconomic impacts that will be felt by both trappers and outfitters in the area.
- If the project goes through as proposed, new trails will have to be developed by the trapper and outfitter. This would cost time and money, which would have to be compensated for. In addition, how does one calculate the value of the impacts on lifestyles? Tourism based activities may diminish with the development of an additional road.

YZC Response:

The project is not expected to cause an increase in wildlife mortality due to increased human harvest resulting from road access. This is primarily because of the proposed mitigation strategies for vehicle and firearm restrictions, as well as access control. Please see responses to the above comments provided under EAR Sections 10.3.26, 10.3.26.1, 10.3.26.4 and 10.3.26.5 that provide further details on these mitigation strategies.