

## Memo



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To: Angela Waterman  
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From: Colleen Bryden  
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File: Roman Mine Cumulative  
Effects Assessment: Re-  
analysis with Quintette Mine  
Restart

Date: June 17, 2011

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### **OVERVIEW**

At the request of the EAO, PRCI has conducted additional cumulative effects assessments for woodland caribou, grizzly bear and harlequin duck that include the proposed Quintette Mine Restart. In brief, the results of the analyses are:

- The incremental contribution of the Roman Mine Project to the overall decrease in undisturbed caribou core area in the RSA in the Future Case is less than that of the proposed Quintette Mine Restart
- The incremental contribution of the Roman Mine Project to the overall decrease in moderate and higher value grizzly bear habitat in the RSA in the Future Case is much less than that of other mine developments (including the proposed Quintette Mine Restart)
- Rescreening of cumulative effects for grizzly bear mortality risk found that a quantitative cumulative effects assessment was still not necessary
- Rescreening of cumulative effects for harlequin duck habitat found that a quantitative cumulative effects assessment was still not necessary
- The proposed Quintette Mine Restart is not expected to interact with the effects on harlequin duck health predicted for the Roman Mine Project for Babcock Creek.

The methods and results for each species are presented in detail below.

### **WOODLAND CARIBOU**

#### **INTRODUCTION**

As reported in the Roman Mine Application, the screening for a cumulative environmental effect on caribou habitat indicated that a quantitative cumulative effects assessment was required (Section 10.5.1.4 of Application). The results of this assessment are reported in the Application and were updated during the regulatory review process (in response to Comment 144). At the time the Application was

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submitted Teck Coal's proposed Quintette Mine Restart had not been publically disclosed and was, therefore, not on the project inclusion list for any cumulative effects assessment undertaken for the Roman Mine Application.

At the request of the EAO, PRCI has conducted an additional cumulative effects assessment for caribou habitat that includes the proposed Quintette Mine Restart. The methods and results of this analysis are presented below.

### METHODS

The RSA was selected as the spatial boundary for the cumulative effects assessment for caribou habitat. The measurable parameters for this assessment were the spatial extent of the winter and summer core areas. Consistent with the methods used in the Application, only direct habitat loss was considered in this quantitative cumulative effects assessment.

The four cases used for the cumulative effects assessment are:

- Pre-disturbance Case (identical to that used in the Application)—the core winter and summer areas identified for the Quintette herd include disturbed areas; therefore, the total area of each in the RSA is considered to represent pre-disturbance conditions.
- Base Case (identical to that used in the Comment 144 update)—excludes all existing known disturbances that fall within core winter and summer areas in the RSA (up to July 2010). The remaining area of each is considered to represent baseline conditions for undisturbed core area in the RSA.
- Project Case (identical to that used in the Comment 144 update)—the Roman Mine Project will add an additional 470 ha of clearing to the RSA, some or all of which will overlap core winter and summer areas.
- Future Case (modified from that used in the Comment 144 update)—in addition to the Project, this case includes logging, oil and gas development, the proposed Horizon Mine Project, and the proposed Quintette Mine Restart.

The Quintette Mine Restart footprint used in the cumulative effects assessment for caribou habitat is based on Figure 8 in the *Proposed Quintette Mine Restart: Preliminary Project Description* (Teck Coal Ltd., dated March 28, 2011) and includes Windy Pit, East Windy Dump, West Windy Dump, Window Pit and Window Dump.

### RESULTS

#### Base Case

There is a 15.0 to 16.9 percent decrease in the availability of undisturbed core area in the RSA from Pre-disturbance to Base Case (Table 1). The Trend Coal Mine accounts for the majority (60 to 63 percent) of this reduction. Considered on its own, the Trend Coal Mine reduced undisturbed winter core area by 10.7 percent (1245 ha) and undisturbed summer core area by 9.0 percent (1378 ha) from Pre-disturbance to Base Case.

Whether or not there are already residual cumulative effects on caribou habitat at Base Case is unknown. Despite the current level of development in the RSA, the most recent population trend information for this herd indicates that it is increasing<sup>1</sup> and the population of the Babcock-Quintette subgroup appears to have remained generally stable over the past 20 years (Section 10.5.1.3 of Application).

**Table 1 Cumulative Effects Assessment for Undisturbed Caribou Core Area with Proposed Quintette Mine Restart Included in Future Case**

Core Area	Pre-disturbance Case	Base Case	Change from Pre-disturbance Case to Base Case		Project Case	Change from Base Case to Project Case		Future Case	Change from Base Case to Future Case	
	ha	ha	ha	%	(ha)	ha	%	ha	ha	%
Winter	11,649	9,678	-1,971	-16.9	9,215	-463	-4.8	9,214	-1045	-10.8
Summer	15,241	12,958	-2,283	-15.0	12,488	-470	-3.6	12,487	-1216	-9.4

**Project Case**

With the introduction of the Roman Mine Project, the availability of undisturbed core area is reduced a further 3.6 to 4.8 percent in the RSA from Base Case to Project Case (Table 1). The largest percent reduction is for winter core area and the largest area reduction is for summer core area (Table 1). Reclamation is not expected to restore the original feeding value of these disturbed areas<sup>2</sup>.

**Future Case**

As noted above, mining, oil and gas development and logging were the future activities included in the cumulative effects assessment for caribou habitat. The logging will be primarily related to the salvage of beetle-killed trees and is unlikely to infringe on any core area given the overlap of these areas with approved UWR and WHA which restrict forest activities. The proposed Horizon Mine Project is mainly situated within the SBS biogeoclimatic zone and outside any core areas and the proposed oil and gas development in core area is small (<1 ha). The proposed Quintette Mine Restart does, however, overlap with winter and summer core areas on Babcock Mountain.

There is a 9.4 to 10.8 percent decrease in the availability of undisturbed core area in the RSA from Base Case to Future Case (Table 1). The proposed Quintette Mine Restart accounts for the majority (56 to 61 percent) of this reduction. The Roman Mine Project accounts for 39 to 44 percent of this reduction.

<sup>1</sup> D. Seip and Jones, E. 2011. *Population Status of Threatened Caribou Herds in the Central Rockies Ecoregion of British Columbia, 2011.*

<sup>2</sup> PRCI has initiated high elevation reclamation research trials on its Trend Property this year in response to this concern. These research trials are likely to improve the value of high elevation reclaimed areas for caribou feeding over what has been achieved in the past on mine sites in northeast BC.

## **SUMMARY**

Not unexpectedly, the loss of caribou core area in the Future Case is greater than what is predicted in the Application and the Comment 144 update when the proposed Quintette Mine Restart is included. This is because the loss of core area associated with the proposed Quintette Mine Restart is additive to the loss associated with the Roman Mine Project. However, the point of the cumulative effects assessment is to consider the incremental contribution of each project to the cumulative effect. In that context, the incremental contribution of the Roman Mine Project to the overall decrease in undisturbed caribou core area in the RSA in the Future Case is less than that of the proposed Quintette Mine Restart (approximately 40:60).

## **GRIZZLY BEAR**

### **INTRODUCTION**

As reported in the Roman Mine Application, the screening for a cumulative environmental effect on grizzly bear habitat and mortality risk indicated that quantitative cumulative effects assessments were not required (Sections 10.5.5.4 and 10.5.5.5 of Application). The results of this assessment are reported in the Application. At the time the Application was submitted Teck Coal's proposed Quintette Mine Restart had not been publically disclosed and was, therefore, not on the project inclusion list for any cumulative effects assessment undertaken for the Roman Mine Application.

At the request of the EAO, PRCI has conducted an additional cumulative effects assessment for grizzly bear habitat and mortality risk that includes the proposed Quintette Mine Restart. The methods and results of these analyses are presented below.

### **METHODS**

#### **Habitat**

In the Application the screening process ruled out the need for a quantitative cumulative effects assessment for grizzly bear habitat (Section 10.5.5.4 of Application). However, with the introduction of the proposed Quintette Mine Restart a quantitative cumulative effects assessment was deemed necessary by the EAO. The RSA was selected as the spatial boundary for the cumulative effects assessment for grizzly bear habitat. The measurable parameters for this assessment were the spatial extent of moderate and higher value grizzly bear spring, summer and fall feeding habitat. Both direct and indirect effects on habitat value<sup>3</sup> were considered in this cumulative effects assessment.

The three cases used for the cumulative effects assessment are:

- Base Case (identical to the 'baseline' scenario described in Section 10.2.4 of the Application)—reflects the effects of existing human-caused disturbances (current to December 2008). The entire Trend Coal Mine is considered active in the Base Case.

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<sup>3</sup> Methods described in detail in the Application (Section 10.4.1)

- Project Case (identical to the 'project case' scenario described in Section 10.2.4 of the Application)—reflects the worst-case wildlife conditions that could occur during the construction and operations phases of the Roman Mine Project (i.e. full mine build-out). For this case, the Trend Coal Mine is considered inactive<sup>4</sup> but unreclaimed.
- Future Case (not in the Application)—reflects worst-case wildlife conditions and is defined as the Project Case plus 1) active, fully built-out Horizon Mine Project and 2) active, fully built-out Quintette Mine Restart. In reality, reclamation will be progressive and is expected to restore grizzly bear habitat value over time on these mine footprints, but to facilitate the analysis, the Future Case scenario assumes no reclamation and nil bear value for all mine footprints. For this re-analysis, this scenario focussed on mining and does not include all possible future developments (e.g., logging, oil and gas development).

The Quintette Mine Restart footprint used in the cumulative effects assessment for grizzly bear habitat is based on Figure 8 of the *Proposed Quintette Mine Restart: Preliminary Project Description* (Teck Coal Ltd., dated March 28, 2011) and includes Windy Pit, East Windy Dump, West Windy Dump, Window Pit and Window Dump. In addition, it is assumed that the existing plant site will be fully active and high use. The footprint for the plant site was based on the TEM prepared for the Roman Mine RSA.

#### **Mortality Risk**

PRCI has re-done the cumulative effects screening for grizzly bear mortality risk in order to incorporate the proposed Quintette Mine Restart. The cumulative effects screening method is described in detail in the Section 6.5.2 of the Application. The Hart Grizzly Bear Population Unit (GBPU) was selected as the spatial boundary for the cumulative effects assessment for grizzly bear mortality risk; however, linear feature density was only calculated for the RSA. The results of this screening are presented below.

## **RESULTS**

### **Habitat**

#### ***Project Case***

As reported in the Application, the availability of grizzly bear spring and summer feeding habitat in the RSA is virtually unaffected by the Project (Table 2 below, Table 10.5-18 in Application). There is a less than one percent change in the area of moderate or higher value habitat available for each of these seasons in the Project Case, and for spring feeding there is actually a small increase in availability (related to cessation of activity at Trend Coal Mine). A relatively large area of moderate and higher value fall feeding habitat is lost (239.8 ha) in the Project Case although this is only two percent of what is available in the RSA (Table 2 below, Table 10.5-18 in Application). This loss is due to both direct and indirect effects but is tempered somewhat as some areas of suitable grizzly bear habitat adjacent to the Trend Coal Mine return to their original value in the Project Case due to the closure of that mine.

<sup>4</sup> The potential for some post-closure activity on site (e.g., monitoring activities) is accounted for by assigning the Trend Coal Mine footprint a low use designation for application of sensory disturbance buffers

**Table 2 Cumulative Effects Assessment for Grizzly Bear Habitat with Proposed Quintette Mine Restart Included in Future Case**

Season/ Life Requisite	Habitat Rating Class	Base Case	Project Case	Change from Base Case to Project Case		Future Case	Change from Base Case to Future Case	
		ha	ha	ha	%	ha	ha	%
Spring feeding	High	53.3	53.2	-0.1	-0.1	53.3	0.0	0.0
	Moderately high	660.1	663.9	3.8	0.6	651.6	-8.5	-1.3
	Moderate	4,096.5	4,101.3	4.7	0.1	3823.3	-273.2	-6.7
	Total	4,809.9	4,818.4	8.5	0.2	4528.1	-281.8	-5.9
Summer feeding	High	210.5	211.8	1.3	0.6	200.2	-10.3	-4.9
	Moderately high	2,635.4	2,642.7	7.3	0.3	2399.3	-236.1	-9.0
	Moderate	8,532.7	8,498.1	-34.6	-0.4	7527.8	-1004.9	-11.8
	Total	11,378.6	11,352.6	-26.0	-0.2	10127.3	-1251.3	-11.0
Fall feeding	High	124.2	124.3	0.1	0.1	84.1	-40.1	-32.3
	Moderately high	1,924.8	1,961.8	37.0	1.9	1544.5	-380.3	-19.8
	Moderate	9,732.3	9,935.0	202.7	2.1	8989.0	-743.3	-7.6
	Total	11,781.3	12,021.1	239.8	2.0	10617.5	-1163.8	-9.9

**Future Case**

There is a 5.9 to 11.0 percent decrease in the availability of moderate and higher value grizzly bear feeding habitat in the RSA from Base Case to Future Case (Table 2). The Quintette Mine Restart and the Horizon Mine Project together account for almost all of this reduction (79 to 98 percent, depending on season)<sup>5</sup>. The Roman Mine Project accounts for 2 to 21 percent of this reduction, depending on season. The Roman Mine has its largest effect on fall feeding habitat availability. The other two mines have their largest effects on summer and spring feeding habitat.

These are worst-case predictions. Progressive reclamation has not been factored in and there is a large indirect effect of these mines on grizzly bear habitat value that is likely to be relatively quickly reversed once a mine closes. This Future Case scenario also assumes all three mines will be active and fully built-out at the same time and that the Trend Mine is not yet reclaimed.

**Summary**

The incremental contribution of the Roman Mine Project to the overall decrease in moderate and higher value grizzly bear habitat in the RSA in the Future Case is much less than that of other mine developments (including the proposed Quintette Mine Restart) (i.e. approximately 3:97 [spring], 2:98 [summer], 20:80 [fall]).

<sup>5</sup> The Quintette Mine Restart footprint is larger than the Horizon Mine footprint (1379 ha vs. 990 ha)

### **Screening for Cumulative Environmental Effect – Mortality Risk**

Within the Hart GBPU, the residual increase in grizzly bear mortality risk as a result of the Project may overlap with similar environmental effects from logging, mining, hunting and poaching, and to a lesser extent oil and gas. However, the Project's incremental contribution to the cumulative effect is considered negligible for the following reasons:

- Given the proposed mitigation measures, the residual increase in mortality risk is essentially only associated with one effect mechanism (Project-related traffic).
- The residual increase in mortality risk is small and reversible.
- The largest source of human-caused grizzly bear mortality (hunting) is actively managed by the province. For example, 41 grizzly bears were killed in the 2002 to 2003 hunting season in the Peace Region<sup>6</sup>. In addition, an average of 3.4 bears (both species) is reported killed by traffic each year in District 8<sup>7</sup>. Additionally, the annual unreported mortality rate for the Hart GBPU is 1.1 percent<sup>8</sup>. There are also likely to be occasional defence of life and property kills.
- The grizzly bear mortality rate from vehicle collisions is 1 percent in BC.
- Mining, oil and gas development, and logging are the only future disclosed activities in the RSA. There will likely be some new roads developed in conjunction with these activities. Although these roads are unlikely to substantively increase vehicle-related mortality risk they may open up some previously inaccessible areas to hunters and poachers. However, given the existing linear feature density in the RSA is already high (2.25 km/km<sup>2</sup>, Section 10.5.1.5 of Application) this increase may be relatively minor. The preliminary project description for the proposed Quintette Mine Restart states that no new roads (outside the mine footprint) will be constructed and that raw coal will be transported to the plant site by conveyor rather than road.

Based on the results of this re-screening, a quantitative cumulative effects assessment was still not considered necessary for grizzly bear mortality risk.

## **HARLEQUIN DUCK**

### **INTRODUCTION**

As reported in the Roman Mine Application, the screenings for a cumulative environmental effect on harlequin duck breeding habitat and health indicated that quantitative cumulative effects assessments were not required (Sections 10.5.13.4 and 10.5.13.5 of Application). At the time the Application was submitted Teck Coal's proposed Quintette Mine Restart had not been publically disclosed and was, therefore,

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<sup>6</sup> BC Ministry of Water, Land and Air Protection. 2003. Big Game Hunting Statistics for the 2002/03 Season. Fish and Wildlife Recreation and Allocation Branch, BC Ministry of Water, Land and Air Protection, Victoria, BC.

<sup>7</sup> Sielecki, L.E. 2004. WARS 1983–2004: Wildlife Accident Reporting and Mitigation in British Columbia, Special Annual Report. Environmental Management Section, Engineering Branch, BC Ministry of Transportation, Victoria, BC.

<sup>8</sup> Austin, M.A., D.C. Heard, and A.N. Hamilton. 2004. Grizzly bear (*Ursus arctos*) harvest management in British Columbia. BC Ministry of Water, Land and Air Protection, Victoria, BC.

not on the project inclusion list for any cumulative effects assessment undertaken for the Roman Mine Application.

At the request of the EAO, PRCI has re-done the cumulative effects screenings for harlequin duck breeding habitat and health in order to incorporate the proposed Quintette Mine Restart. The results of these screenings are presented below.

**SCREENING FOR CUMULATIVE ENVIRONMENTAL EFFECT – BREEDING HABITAT**

Within the RSA, the residual loss of harlequin duck breeding habitat as a result of the Project may overlap with similar environmental effects from mining, and to a lesser extent logging and oil and gas. However, the Project's incremental contribution to the cumulative effect is considered negligible for the following reasons:

- There no direct residual loss of harlequin duck breeding habitat predicted although there may be some indirect effects due to sensory disturbance (Section Section 10.5.13.4 of Application).
- Residual alteration due to sensory disturbance is small and reversible (Section Section 10.5.13.4 of Application).
- Forest practice regulations and guidelines would have limited past disturbance to riparian areas to some extent.
- Mining, oil and gas development, and logging are the only future disclosed activities in the RSA. The logging will be primarily related to the salvage of beetle-killed trees and is expected to be large scale. Forest practice regulations and guidelines will limit disturbance to riparian areas; however, there is the potential that the reduction in forest cover may alter flow regimes and could indirectly affect harlequin ducks. The oil and gas development proposed for the RSA is relatively small scale and will be required to avoid or minimize direct disturbance to watercourses. The proposed Horizon Mine Project is in the Barbour Creek drainage where harlequin ducks are known to breed and may result in some direct disturbance to watercourses in this drainage. Based on Figures 10d and 10e of the *Proposed Quintette Mine Restart: Preliminary Project Description* (Teck Coal Ltd., dated March 28, 2011), it is clear that the proposed Quintette Mine Restart will partially overlap existing mine disturbance. These areas have no value to harlequin ducks. The new areas of clearing appear to affect only the upper extents of some small tributaries to the Murray River and Babcock Creek. These areas may have low value as harlequin duck breeding habitat. Both logging and mining traffic and road development may result in increased sensory disturbance in the vicinity of potential harlequin duck breeding habitat.

Based on the results of this re-screening, a quantitative cumulative effects assessment was still not considered necessary for harlequin duck breeding habitat.

**SCREENING FOR CUMULATIVE ENVIRONMENTAL EFFECT – HEALTH**

The preliminary project description for the proposed Quintette Mine Restart does not indicate that there will be any discharge of mine contact waters to Babcock Creek so that project is not expected to interact with the effects on harlequin duck health



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predicted for the Roman Mine Project in that drainage (Section 10.5.13.5 of Application).

In a regional context, which includes the Murray River, there is predicted to be negligible incremental increase in selenium concentration in the Murray River due to the Roman Mine Project (Section 14 of Application). The effect of the proposed Quintette Mine Restart on the Murray River is unknown at this time. However, based on the preliminary project description and the characteristics of coal mines in northeast BC, there is the potential for the proposed Quintette Mine Restart to have selenium issues with respect to the Murray River and some of its associated wetlands. Further analysis related to harlequin duck health along the Murray River is not possible at this time.

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