2012 Wildlife Species & Vegetative Assessment

Rio Tinto Eagle Mine

February 2013

Prepared by:

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UPLAND VEGETATIVE SURVEY PHOTOGRAPHS

1.0 INTRODUCTION

King & MacGregor Environmental Inc. (KME) was contracted by Rio Tinto Eagle Mine to collect ecological information within the Eagle Project Site (Study Area) located in northern Marquette County, Michigan (Figure 1-1). KME conducted ecological surveys during 2006, 2007, 2008, 2011, and 2012 for birds, small mammals, large mammals, and frogs and toads. In addition, wetland monitoring and upland vegetative surveys were conducted during 2007, 2008, 2011, and 2012. This report is intended to describe the findings of the surveys conducted during 2012 and should be considered a supplement to the *Wildlife Species Assessment*, dated April 5, 2007 (KME 2007), which describes the results of the 2006 surveys, the *2007 Wildlife Species & Vegetative Assessment*, dated March 28, 2008 (KME 2008), which describes the results of the 2007 surveys, the *2008 Wildlife Species & Vegetative Assessment*, dated December 19, 2009 (KME 2009), which describes the results of the 2008 surveys, and the 2011 Wildlife Species & Vegetative Assessment, dated January 2012 (KME 2012), which describes the results of the 2011 surveys.

1.1 Study Area

The Study Area is located in Sections 1, 2, 3, 10, 11, and 12, Michigamme Township (T50N, R29W), Marquette County, Michigan (Figure 1-2).

1.2 Project Purpose

The purpose of this evaluation is to continue baseline ecological investigation of birds, small mammals, large mammals, frogs and toads, wetland vegetation, and upland vegetation within the Study Area. Sampling points are shown on Figure 1-3.

2.0 BIRDS

2.1. Methods

The methodologies used and described in the *Wildlife Species Assessment* and the *2007 Wildlife Species & Vegetative Assessment* were employed during the 2012 bird surveys. A breeding bird survey was conducted during June 12 through 14, 2012, at 26 survey points established in prior years. Five survey points (Points 9, 10, 15, 16, and 20) were removed from the original set of 31 points because of inaccessibility issues (i.e., were within the fenced, active mine facility area). A fall bird survey was conducted during September 27 and 28, 2012, at 18 survey points (Figure 1-3). Survey points 4, 5, 6, 7, 8, 17, 18, and 19 were not included in the fall survey set so as to be consistent with fall bird surveys

conducted in prior years (i.e., these points are surveyed during June only). Each point was surveyed twice (i.e., two days) during the breeding bird June survey and also twice during the fall.

2.2 Results

During the June breeding bird survey, 479 birds representing 37 species were observed (Tables 2-1a and 2-1b). During the September survey, 310 birds representing 20 species were observed (Tables 2-2a and 2-2b). A combined total of 789 birds representing 43 species were identified during the June and September bird surveys (Table 2-3). Additionally, Ruffed Grouse (*Bonasa umbellus*) were occasionally seen or heard during the vegetative surveys in June and September 2012, near Survey Points 22, 23, 28, and 29. Spruce grouse (*Falcipennis canadensis*) were occasionally observed during the seasonal vegetative surveys along the main two-track west of Survey Point 30. Several Whip-poor-wills (*Caprimulgus vociferous*), several American Woodcock (*Scolopax minor*), and at least one Wilson's Snipe (*Gallinago delicata*) were heard calling or winnowing at dusk throughout the southwest portion of the Study Area. These species were heard during April 24, May 2, and May 22-23 when biologists were navigating to frog and toad survey locations. An American Bittern (*Botaurus lentiginosus*) was seen flying near the Salmon Trout River headwaters during the May 23 frog and toad survey. American Bittern is a State Special Concern species. The Federally Endangered and State Endangered Kirtland's warbler (*Dendroica kirtlandii*) was not detected at any time during the 2012 KME ecological surveys.

2.3 Discussion

The bird species identified during the 2012 bird surveys are similar to those bird species identified in previous surveys conducted within the Study Area and are consistent with the bird species one would expect in the habitats present.

3.0 MAMMALS

3.1 Small Mammals

3.1.1 Methods

The methodologies utilized during the 2012 small mammal survey were consistent with those used and described in the *Wildlife Species Assessment* and the *2007 Wildlife Species & Vegetative Assessment*. To lesson trap mortality rates during the 2011 and 2012 surveys,

both small snap traps were replaced with two small Sherman box traps at every survey point. Therefore, modified sampling methods employed the use of three small Sherman box traps and one large snap trap at every survey point. Sampling was conducted on September 19, 20, and 21, 2012. Survey Points 15 and 20 were not sampled during 2012 because of inaccessibility (i.e., were within the active mine facility). Therefore, ten of the original 12 survey points were sampled during the 2012 survey (Figure 1-3). Each survey point was sampled on three consecutive days, for a total of 30 sampling events.

3.1.2 Results

Thirty-six small mammals representing seven species were identified during the September survey period: white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), masked shrew (*Sorex cinereus*), least chipmunk (*Tamias minimus*), boreal redback vole (*Clethrionomys gapperi*), Northern flying squirrel (*Glaucomys sabrinus*), and long-tailed weasel (*Mustela frenata*) (Table 3). The most common small mammal identified during the survey was the boreal redback vole. Snowshoe hares (*Lepus americanus*) and their tracks were occasionally seen throughout the Study Area during the 2012 KME ecological surveys. No Threatened, Endangered, or Special Concern small mammals were observed.

3.1.3 Discussion

The small mammals encountered within the Study Area during the 2012 surveys are typical of those expected in the habitats present and are generally consistent with previous survey results. A difference from the previous year was the emergence of the boreal redback vole as the most abundant species sampled. Also notable was the absence of Eastern chipmunks (*Tamias striatus*) within traps. As in other years, red squirrels appeared to be relatively common throughout the Study Area but appear to be highly adept at trap avoidance. Other regionally common species possibly present or previously observed within the Study Area but not noted during the KME 2012 surveys include muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and porcupine (*Erethizon dorsatum*). Small mammals appeared to be distributed throughout wooded and open areas in upland and wetland habitats.

3.2 Large Mammals

3.2.1 Methods

The methodologies described in the *Wildlife Species Assessment* and the *2007 Wildlife Species & Vegetative Assessment* were employed during the 2012 large mammal surveys. Although methodology did not include surveying specifically for large mammals, all observed evidence of large mammal presence was noted in the course of conducting field work for other wildlife and vegetation within the Study Area.

3.2.2 Results

The whitetail deer (*Odocoileus virginianus*) and gray wolf (*Canis lupus*) were the only large mammal species directly observed during the 2012 surveys. Deer were seen infrequently throughout the Study Area during the course of the KME ecological surveys. Although no American black bears (*Ursus americanus*) were seen in 2012, evidence of their occasional presence (e.g., mauled survey plot stakes and shredded plastic flagging tape) was found at several of the survey points – especially those located in coniferous wetlands near the Salmon Trout River headwaters. Scat and tracks of black bear, moose (*Alces alces*), and coyote (*Canis latrans*) were observed occasionally throughout the Study Area. Evidence of beaver (*Castor canadensis*) activity (e.g., damming and lodges) was observed along the headwaters of the Salmon Trout River. Gray wolf tracks and scat were observed in various locations within the Study Area during the course of the KME 2012 ecological surveys. A single, mature gray wolf was directly observed by KME biologists near Survey Point 21 during late June, 2012.

3.2.3 Discussion

All of the large mammal species detected during the 2012 surveys are species that would be expected in the habitats present. Other regionally common species possibly present or previously observed within the Study Area but not noted during the KME 2012 surveys include red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), and river otter (*Lutra canadensis*).

4.0 FROGS AND TOADS

4.1 Methods

The methodologies used and described in the *Wildlife Species Assessment* and the *2007 Wildlife Species & Vegetative Assessment* were employed during the 2012 frog and toad

survey. KME used the same three frog and toad sampling points previously established in 2006 (Figure 1-3). The survey was conducted after sunset during April 24, May 2, May 22, May 23, and June 28, 2012. Nocturnal bird species' calls were also documented during the course of the frog and toad survey. These are reported in Section 2.2.

4.2 Results

Three frog species and one species of toad were heard during the survey: northern spring peeper (*Pseudacris crucifer*), gray treefrog (*Hyla versicolor*), green frog (*Rana clamitans*), and the American toad (*Bufo americanus*) (Table 4). Frog and toad calling activity included Call Index values of 1, 2, and 3. While KME biologists never heard Mink frogs (*Rana septentrionalis*) calling during the 2012 survey, two adult mink frogs were observed near Survey Point FT03. No Threatened, Endangered, or Special Concern frog or toad species were identified during the 2012 survey.

4.3 Discussion

All three of the sampling points exhibited use by frogs and/or toads for breeding. The most frequently recorded species was the northern spring peeper. The frog and toad species identified are typical of those expected in the habitats present in the Study Area.

5.0 THREATENED AND ENDANGERED SPECIES

5.1 Methods

The Michigan Natural Features Inventory (MNFI) maintains a database of rare plants and animals in Michigan. Prior to the 2012 surveys, KME conducted a search of the Michigan Natural Features Inventory (MNFI) database to determine if any protected species had been found in or near the Study Area. In accordance with Michigan Department of Natural Resources (MDNR) guidelines (MDNR 2001), KME surveyed for any MNFI Listed species or their habitats during the appropriate season.

5.2 Results

The MNFI database query on August 6, 2008, indicated the presence of State Threatened narrow-leaved gentian (*Gentiana linearis*) along the Salmon Trout River within the Study Area. Year 2012 narrow-leaved gentian survey results were similar to those of the 2010 and 2011 surveys (Meier 2010, KME 2012b, KME 2013). Flowering NLG were found in abundance (hundreds) along the Salmon Trout River in approximately the same areas

where they were previously observed. In recent years, no narrow-leaved gentian have been found within the previously occupied headwater reach of the river where it flows through the southwest portion of the Study Area; this is apparently because of beaver pond flooding. No narrow-leaved gentian were documented as incidental species during ecological surveys within other portions of the Study Area.

Spruce grouse is State Special Concern species; this species was occasionally observed during the seasonal vegetative surveys along the main two-track west of Survey Point 30. An American Bittern (State Special Concern) was seen flying near the Salmon Trout River headwaters during the May 23 frog and toad survey. Scat and tracks of moose (State Special Concern) were observed occasionally throughout the Study Area. The gray wolf was removed from the Federal Endangered Species List in 2012. Tracks and scat were observed in various locations within the Study Area during the course of the KME 2012 ecological surveys. A single, mature gray wolf was directly observed by KME biologists near Survey Point 21 during late June. Indirect evidence of gray wolves, which included tracks and scat, was observed during the 2006, 2007, 2011, and 2012 KME ecological surveys.

5.3 Discussion

After having been removed from protection under the Federal Endangered Species Act in 2007, gray wolves in the western Great Lakes region were re-listed on September 29, 2008. The U.S. Fish and Wildlife Service's decision to remove gray wolves in the western Great Lakes region (including Michigan) from the federal Endangered Species List became official on January 27, 2012. However, gray wolves remain a protected, nongame species in Michigan, with management authority officially given to the MDNR.

6.0 WETLAND VEGETATIVE MONITORING

6.1 Methods

An assessment of nine wetland areas (Figure 1-3) was conducted during the early growing season vegetation survey; the survey occurred during June 19 through June 21 and was completed on June 28, 2012. Each wetland vegetative survey point consisted of a 30-foot radius circular plot and a nested, fixed-frame quadrat (3.28 ft. x 3.28 ft. plot). Wetland survey points are referenced as 1W, 6W through 10W, 12W, 13W, and 26W. Point 11W was not sampled in 2011 and 2012 because of the presence of a drill rig. Plot centers and perimeters had been permanently established during prior years. In 2011, wooden posts

used as center markers were replaced with fiberglass posts. Steel rebar pins demarcating the midpoints of the northern and southern sides of each quadrat were reinforced with taller fiberglass posts. The perimeters of the 30-foot radius circular plots were refreshed with fiberglass posts and plastic flagging tape during 2011 and 2012. Photographs were taken during late June at each survey point, showing a view northward from the center of the 30-foot-radius plot, a view southward from the center of the 30-foot-radius plot, and an overhead view of the quadrat (Wetland Vegetative Survey Photographs, 1 through 27).

At each survey point quadrat, the ratio of duff and/or bare soil (i.e., non-vegetated surface area) was estimated and represented as a percentage. Within a quadrat, percent cover (in five percent intervals) of each plant species in the herbaceous stratum was estimated; the herbaceous stratum includes all herbaceous species and also includes woody plants (e.g., tree and shrub seedlings) less than 3.2 feet tall. The number of woody trunk stems of plants in the combined shrub/sapling and overstory stratum (woody plants greater than 3.2 feet tall) was determined within each 30-foot-radius circular plot.

The following protocol was established in previous years to rigidly standardize the procedure for counting woody trunk stems: To be eligible for enumeration, a woody trunk stem must originate from the ground as a unique feature. Where two stems emerge from the ground in close proximity, they are considered individual trunk stems only if the surveyor's index finger can be placed on soil (*not* leaf duff) between the two stems. A woody trunk stem is considered to be within the 30-foot-radius survey plot based on the location of where the stem emerges from the ground, regardless of whether the trunk stem leans into the plot or whether the stem's canopy is within or outside the plot. According to the protocol, a trunk stem is not counted if it is leaning so that the vertical height is less than 3.2 feet above the ground. Only one stump sprout may be counted where an original stump is present and where multiple sprouts originate from that original stump; i.e., only one stump sprout per clump may be counted.

All plants were recorded to species level, whenever possible. Specimens that could not be identified during the field survey were later identified using magnification equipment and applicable regional botanical keys (Gleason and Cronquist 1991; Voss 1972, 1985, 1996). Plants not identifiable to the species level were counted as native species only if it was determined that non-native species from the genera in question were unlikely to be present. Every tabular record within each plant species list (Tables 6a through 6c) contains the

scientific name, common name, wetland indicator code, and native/non-native status. Most species also have an associated coefficient of conservatism (C). Coefficients of conservatism range from 0 to 10 and represent an estimated probability that a plant species is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition (Herman et al. 2001).

To determine the degree to which the vegetation identified within each survey plot consisted of wetland species, the wetland indicator codes developed by the U.S. Fish and Wildlife Service (USFWS) and elaborated in the *Floristic Quality Assessment with Wetland Categories and Examples of Computer Applications for the State of Michigan* (Herman et al. 2001) were used. These codes are OBL (obligate wetland species), FACW (facultative wetland species), FAC (facultative species), FACU (facultative upland species), and UPL (upland species). OBL species occur in wetlands >99% of the time; FACW species occur in wetlands >66% of the time; FAC species occur in wetlands 50% of the time; FACU species occur in wetlands <33% of the time; UPL species occur in wetlands <1% of the time. The plus and minus signs that accompany some of the codes indicate a greater (+) or lesser (-) affinity for wetlands. To quantitatively determine the degree to which the vegetation was dominated by wetland species, each wetland indicator code was assigned a value: UPL = 5, FACU- = 4, FACU = 3, FACU+ = 2, FAC- = 1, FAC = 0, FAC+ = -1, FACW- = -2, FACW = -3, FACW+ = -4, OBL = -5. The average of these numbers serves as an index for evaluating the "wetness" of the vegetation at a site. When the average is greater than zero, the vegetation consists predominantly of non-wetland species (ranging from FAC- to UPL), whereas a negative average indicates a prevalence of wetland species (ranging from FAC+ to OBL). Soils were not evaluated in 2012 because it is not likely that they would have changed noticeably since 2008.

6.2 Results

Year 2012 wetland sampling point data is presented in Tables 6a through 6c. Table 6a summarizes the herbaceous data collected within each wetland quadrat; percent duff/bare soil is also listed for each quadrat. Table 6b summarizes the woody species data collected within each 30-foot radius wetland plot. Table 6c is an overall species list of the plants found within all of the wetland sampling plots; it summarizes the combined data and lists the total number of species, total number of native species, mean wetland indicator number, and mean coefficient of conservatism (C).

A total of 67 different plant species were observed during the 2012 wetland surveys (Table 6c). Overall, the plots contain an average of 90 percent native species (Table 6c). Wetland indicator values in the herbaceous stratum range from UPL to OBL (Table 6a). No plants were significantly more prevalent than others in this stratum. In the shrub/sapling and overstory stratum (i.e., woody species), the values range from UPL to OBL (Table 6b). The most commonly encountered species were balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), and black spruce (*Picea mariana*). The coefficients of conservatism ranged from 0 to 10 for all plots combined, with an average of 4.2 (Table 6c). No state or federally protected plant species were identified.

6.3 Discussion

Overall, the wetland botanical species assemblages do not appear to have changed significantly since the beginning of the KME study period. The mean wetland indicator code value for all of the plots is within the FAC to FAC+ range, indicating a species assemblage adapted to moderately wet conditions. The coefficients of conservatism associated with each plot generally indicate a flora with moderate to low fidelity to specific natural communities. One notable exception to this is 26W, which is within a bog/muskeg. The data provides qualitative and quantitative baselines against which to measure future monitoring results and determine if significant changes are occurring.

7.0 UPLAND VEGETATIVE MONITORING

7.1 Methods

Year 2012 early growing season monitoring of upland vegetation was conducted during June 19 through June 21 and completed on June 28; monitoring occurred at 18 survey points along seven transects. Late summer monitoring was conducted on September 5 and 6 at the same 18 upland survey points. Herbaceous and woody vegetative sampling procedures were identical to those used during the 2012 wetland sampling (see Section 6.1). Survey points are referenced as 1 through 3, 11 through 14, and 21 through 31 (Figure 1-3). Survey Points 10, 15, and 20 were inaccessible (i.e., were within the active mine facility) in 2012 and therefore were not surveyed. Photographs were taken during late June at each survey point, showing a view northward from the center of the 30-foot-radius plot, a view southward from the center of the 30-foot-radius plot, and an overhead view of the quadrat (Upland Vegetative Survey Photographs, 1 through 54).

7.2 Results

Year 2012 upland vegetative survey plot data is presented in Tables 7-1a through 7-2c. Tables 7-1a (June) and 7-2a (September) summarize the herbaceous data collected within each quadrat; percent duff/bare soil is also listed for each quadrat. Tables 7-1b (June) and 7-2b (September) summarize the woody species data collected within each 30-foot radius plot. Table 7-1c is an overall species list of the plants found within all of the upland vegetative survey plots during June. Table 7-2c is an overall species list of the plants found within all of the upland vegetative survey plots during September. Tables 7-1c and 7-2c summarize the combined data and list the total number of species, total number of native species, mean wetland indicator number, and mean coefficient of conservatism (C).

A total of 47 different plant species were observed during the June 2012 upland vegetative surveys (Table 7-1c). A total of 53 different plant species were observed during the September 2012 upland vegetative surveys (Table 7-2c). Each plot exhibited 100 percent native species during both upland survey periods.

In both the June and September upland surveys, the most commonly observed plants within the quadrats were bracken fern (*Pteridium aquilinum*), blueberry (*Vaccinium angustifolium*), and unidentified non-sphagnum moss species. Bare soil/duff was also frequently noted in both June and September. Because the foliage of different species can overlap, the total percent cover in some plots exceeds 100 percent.

Within the 30-foot radius circular plots, 20 woody species were identified in a combination of both the June and September upland surveys. The most frequently encountered species in June and September were balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), jack pine (*Pinus banksiana*), and black spruce (*Picea mariana*). Total trunk stems varied little from June to September. Wetland indicator codes ranged from OBL to UPL, with an overall average within the FAC to FAC- range for each survey season.

The coefficients of conservatism ranged from 0 to 10, with an average of 4.6 for all June plots and average of 4.6 for all September plots (Table 7-1c and 7-2c). No state or federally protected plant species were documented.

7.3 Discussion

The data provides qualitative and quantitative baselines against which to measure future monitoring results and determine if significant changes are occurring. The minor difference between the June and September herbaceous plant lists is likely due to seasonal plant emergence and seasonal senescence. The slight seasonal variation within the 30-foot radius plots is likely attributable to natural mortality and recruitment. The wide range of wetland indicator codes indicates a wide variability of microtopographical conditions. The moderate overall coefficient of conservatism average reflects the virtual lack of non-native species. Overall, the vegetative assemblage appears to be similar to that which was documented in previous KME surveys.

8.0 CONCLUSION

The wildlife and plant species identified during the 2012 surveys within the Study Area are similar to those identified during the 2006, 2007, 2008, and 2011 KME surveys. Forty-three species of birds, none of which are Threatened or Endangered, were observed during the bird surveys, and six additional bird species were identified during other KME surveys (e.g., nocturnal surveys for frog and toad species). Seven small mammal species, none of which are Threatened or Endangered, were documented. Two species of large mammal was directly observed by KME biologists and indirect evidence of four other large mammal species was also documented. None of the large mammal species recorded in 2012 are Threatened or Endangered. However, gray wolves remain a protected, nongame species in Michigan. Four frog species and one species of toad were identified; none of them are Threatened or Endangered. Vegetative sampling plots in both wetland and upland communities identified plant species that are relatively common within the region. No Threatened or Endangered plant species were encountered within the vegetative survey plots. Narrow-leaved gentian plants (a State Threatened plant species) were found by KME botanists in abundance (hundreds) along the Salmon Trout River in approximately the same areas where they were recorded in 2010 and 2011. All of the wildlife and plant species identified within the Study Area are typically associated with vegetative communities that are relatively common within the region.

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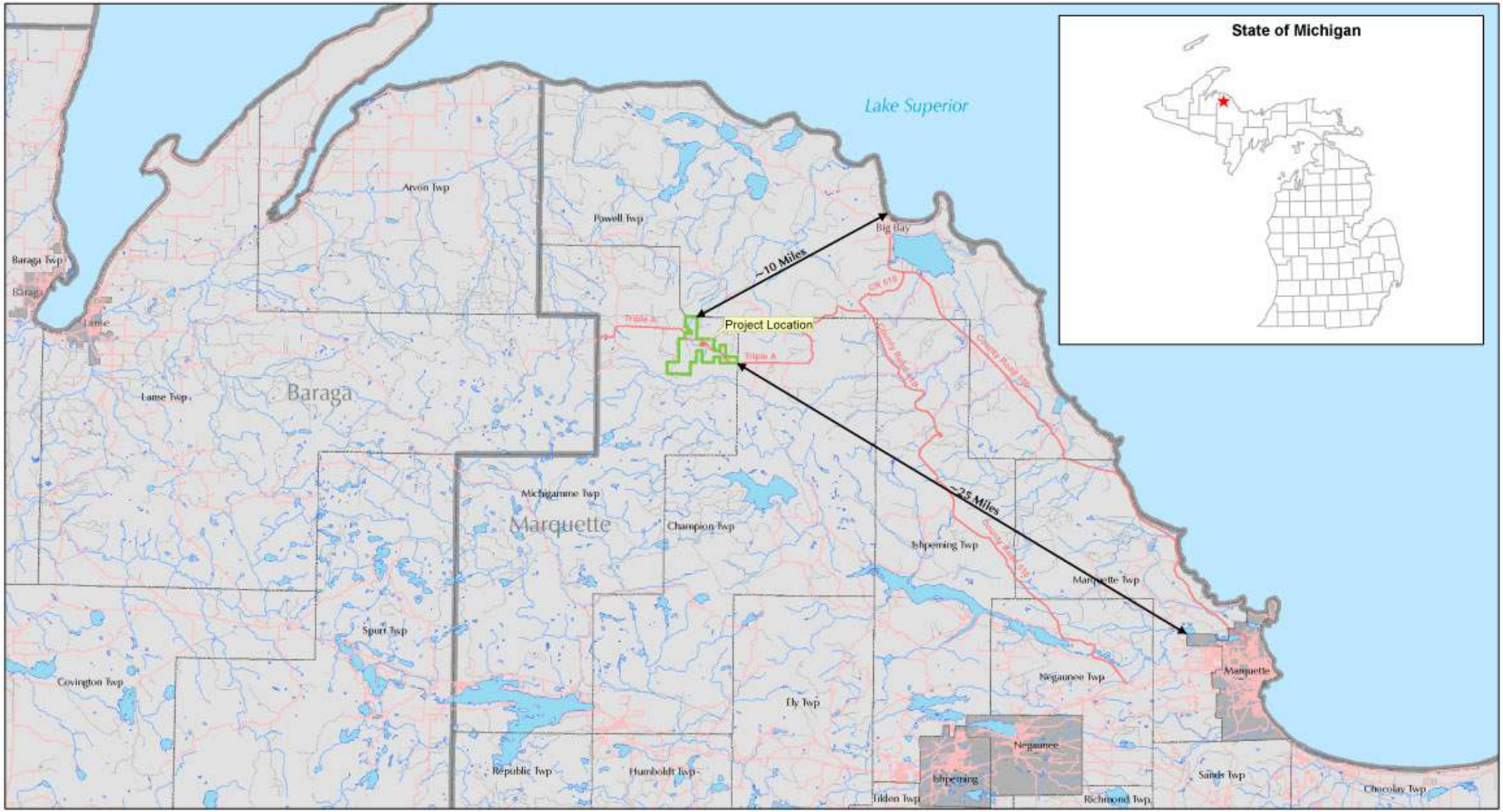
FIGURES



NOTES

1. Surface property boundary as of November 18, 2004 supplied by Kennecott via Golder & Associates Inc., August, 2005.
2. Horizontal datum based on NAD 83/94
   Horizontal coordinates based on UTM Zone 16.
3. All base information downloaded from Michigan Center of Geographic Information (http://www.michigan.gov/cgi)
4. Site Location - Project Site within Sections 11 &12, T50N, R29W, Town of Michigamme, Marquette County, Michigan.

LEGEND

- Counties
- Minor Civil Divisions
- Kennecott Surface Ownership
- Lakes and Rivers
- Highways
- Major Roads
- Minor Roads

N

King & MacGregor Environmental, Inc.

Foth

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	AKM	DATE: MAR '08
APPROVED BY:	SVD1	DATE: MAR '08
APPROVED BY:		DATE:

Kennecott Eagle Minerals

FIGURE 1-1
PROJECT LOCATION

Scale: 0 2 4 Miles

Date: MARCH, 2008

Prepared by: BJW1

Scope: 04W018

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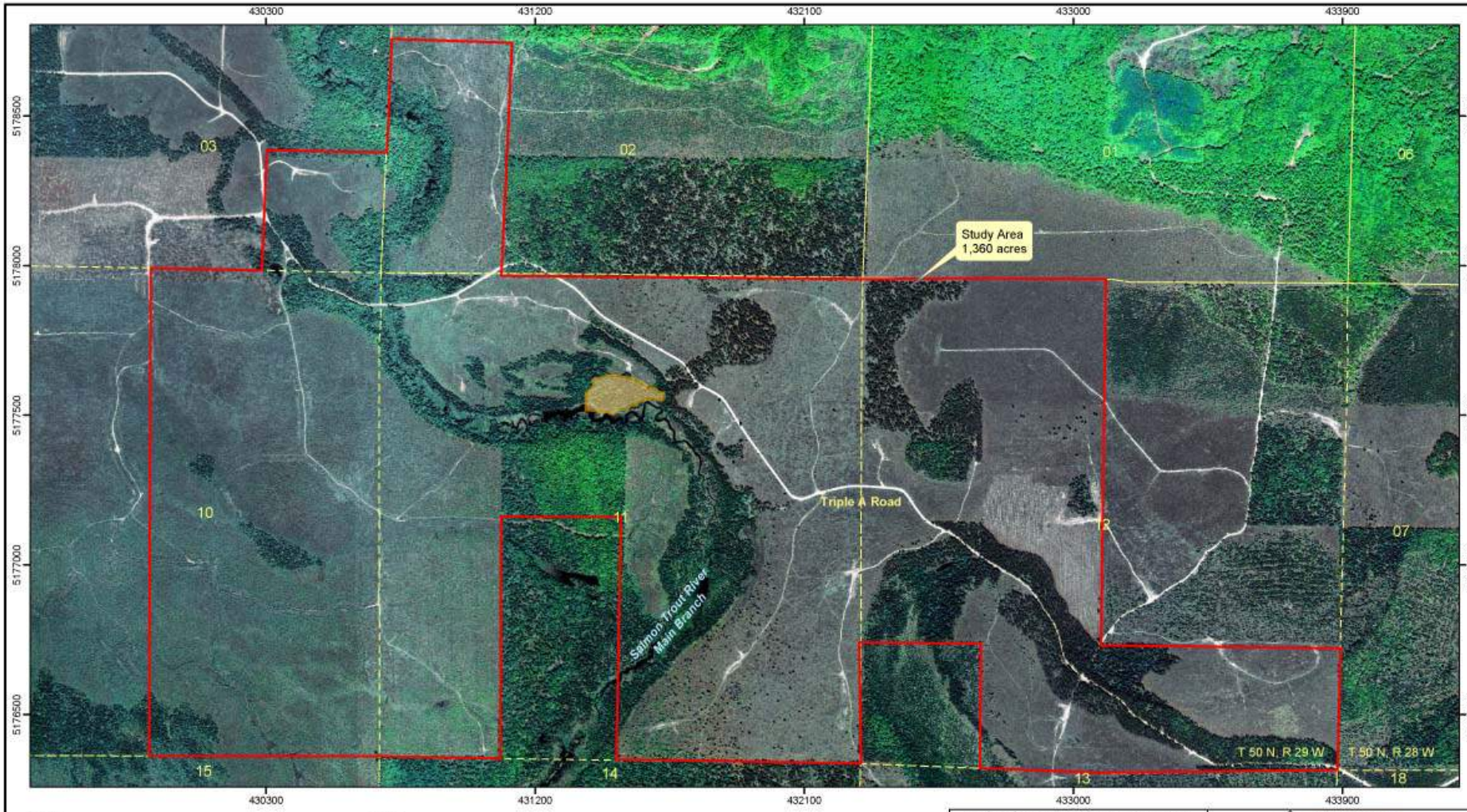


NOTES

1. Surface Property Boundary, Ore Body, and Orthophotography supplied by Kennecott via Golder Associates Inc., August, 2005
2. Horizontal datum based on NAD 83/94
   Horizontal coordinates based on UTM Zone 16
3. Site Location - Project Site within Sections 11 &12, T50N, R29W, Town of Michigamme, Marquette County, Michigan

LEGEND

- Study Area
- Sections
- Ore Body

N

King & MacGregor Environmental, Inc.

Foth

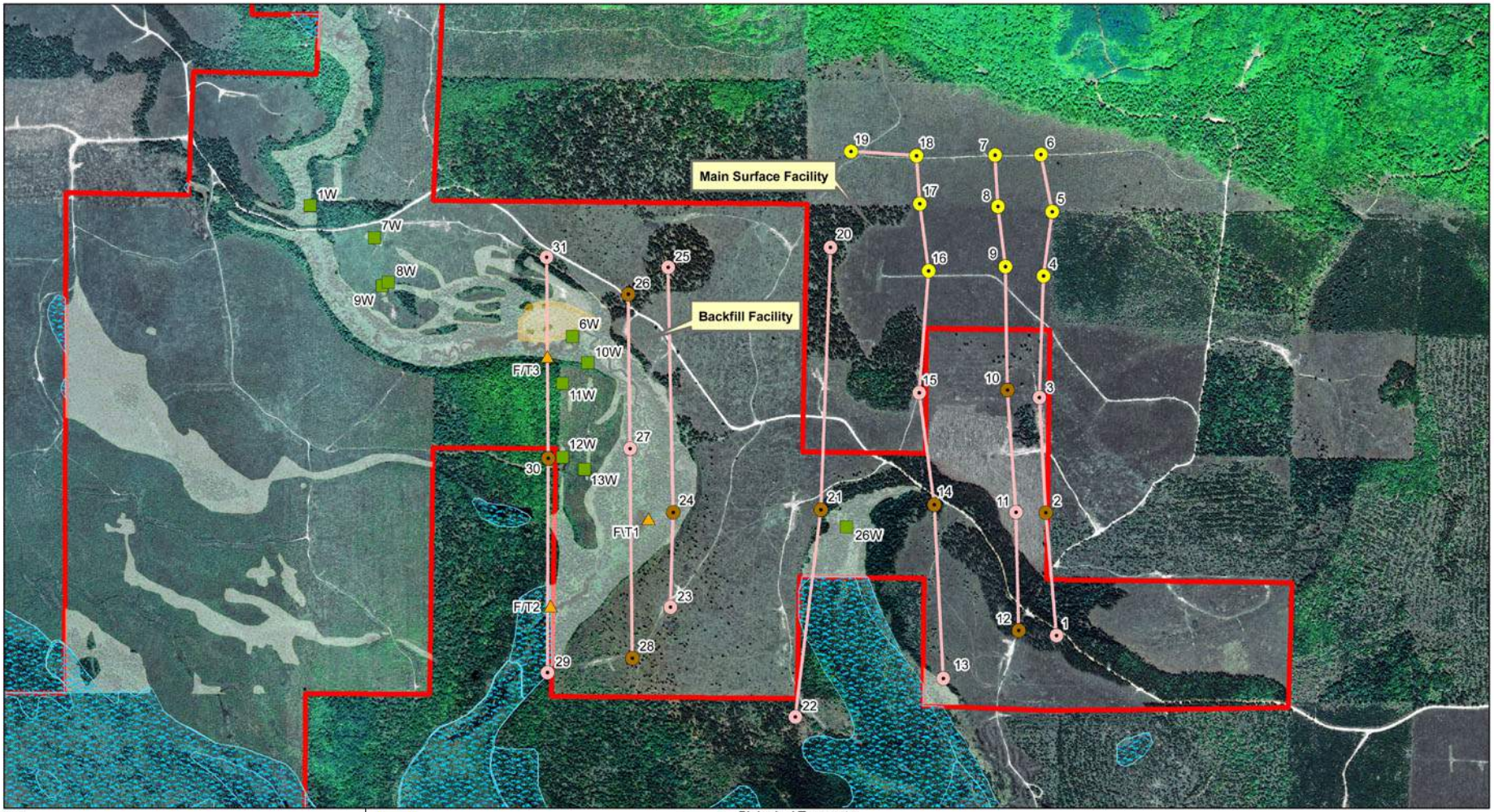
Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY: AKM			DATE: MAR '08
APPROVED BY: SVD1			DATE: MAR '08
APPROVED BY:			DATE:

Kennecott Eagle Minerals

FIGURE 1-2
STUDY AREA

Scale: 0 150 300 Meters | Date: MARCH, 2008
Prepared by: BJW1 | Scope: 04W018

M:\kmceagle\mxd\REDUX2007\studyareamap_Fig1-2_11x17.mxd March 28, 2008



NOTES

1. Surface Property Boundary, Ore Body, and Orthophotographysupplied by Kennecott via Golder Associates Inc., August, 2005.
2. Wetland boundary (Wetland and Coastal Resources), Wildlife Assesment Transects and Narrow-Leaved Gentian supplied by Kennecott via Golder Associates Inc., August, 2005.
3. Horizontal datum based on NAD 83/94. Horizontal coordinates based on UTM Zone 16.
4. US Fish and Wildlife Service Wetlands downloaded from USFWS website.
5. Site Location - Project Site within Sections 11 &12, T50N, R29W, Town of Michigamme, Marquette County, Michigan.
6. Sample type and locations provided by King & MacGregor Environmental, Inc. February 18, 2008.

M:\kmceagle\mxd\REDUX\2007\Screen\fauna_Fig1-3_11x17.mxd March 28, 2008

- Eagle Ore Body
- Location of Surface Facilities
- Kennecott Surface Ownership
- Wetland Complex Boundary
- Wetlands adapted from US Fish and Wildlife Service Wedtlands Inventory Map
- Biological Transects
- Bird Sampling Point
- Bird and Vegetation Sampling Point
- Bird, Vegetation, and Small Mammal Sampling Point
- Frog/Toad Sampling Point
- Wetland Vegetation Sampling Point

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	AKM	DATE: MAR. '08
APPROVED BY:	SVD1	DATE: MAR. '08
APPROVED BY:		DATE:

Kennecott Eagle Minerals

FIGURE 1-3

BIOLOGICAL AND WETLAND SAMPLING AREAS

Scale: 0 100 300 Meters | Date: MARCH, 2008

Prepared by: BJW1 | Scope: 04W018

TABLES

Table 2-1a. Bird Survey Point Data - June 2012

Rio Tinto Eagle Mine

Survey Point	Date	Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Blue-headed Vireo	Brown Thrasher	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Eastern (Ruff-sided) Towhee	Hermit Thrush	Least Flycatcher	Mourning Dove	Nashville Warbler	Northern (Yellow-shafted) Flicker	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Ruby-crowned Kinglet	Sandhill Crane	Song Sparrow	Spruce Grouse	Vesper Sparrow	Whip-poor-will	White-throated Sparrow	White-winged Crossbill	Willow Flycatcher	Yellow-rumped Warbler	**Total Count**	**Species Richness**
1	6/12/12													1						2			2			1		1										1	**8**	**6**
1	6/13/12																			2			3				1								2				**8**	**4**
2	6/12/12		1											2	2	1		2		3			2									1			3				**17**	**9**
2	6/13/12		1									1		1	1			1		1			2												2				**10**	**8**
3	6/12/12													1		1		5		2			3						1		1				4				**18**	**8**
3	6/13/12		1															1					2			1									1				**6**	**5**
4	6/13/12								1									1		2			2			1													**7**	**5**
4	6/14/12													1				2		2			1															3	**9**	**5**
5	6/13/12		1															1		2			3			1												1	**9**	**6**
5	6/14/12					1											1			2			3															1	**8**	**5**
6	6/13/12									3										2			3		1	2									1			1	**13**	**7**
6	6/14/12													1			3	1		2			1		1													1	**10**	**7**
7	6/13/12								1									2		3			1			1													**8**	**5**
7	6/14/12		1											1			2	2		4			2									1							**13**	**7**
8	6/13/12					1												1		1			2			2	1												**8**	**6**
8	6/14/12		1											1			1	2		2			3				1												**11**	**7**
11	6/12/12													1				1		3			3									2		1					**11**	**6**
11	6/13/12		2			1									1	1			1	2			1			1		1						2					**13**	**10**
12	6/12/12													2						2			2															1	**7**	**4**
12	6/13/12													1		1		1		3		1	2			2									3				**14**	**8**
13	6/12/12									2								2		3	1		5												1				**14**	**6**
13	6/13/12	1												1				1					3			1		1							1				**9**	**7**
14	6/12/12																						3			1	2		2										**8**	**4**

Table 2-1a. Bird Survey Point Data - June 2012

Rio Tinto Eagle Mine

Survey Point	Date	Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Blue-headed Vireo	Brown Thrasher	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Eastern (Ruff-sided) Towhee	Hermit Thrush	Least Flycatcher	Mourning Dove	Nashville Warbler	Northern (Yellow-shafted) Flicker	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Ruby-crowned Kinglet	Sandhill Crane	Song Sparrow	Spruce Grouse	Vesper Sparrow	Whip-poor-will	White-throated Sparrow	White-winged Crossbill	Willow Flycatcher	Yellow-rumped Warbler	**Total Count**	**Species Richness**
14	6/13/12					1								1									1			2		1	1										**7**	**6**
17	6/13/12																			1			1			1													**3**	**3**
17	6/14/12																2			1			1															1	**5**	**4**
18	6/13/12								1									1		1			1			2						2						2	**10**	**7**
18	6/14/12											1		1				4		3			1															1	**11**	**6**
19	6/13/12									1										2			1			1									1			1	**7**	**6**
19	6/14/12					1	1									2		5		2													1	1				**13**	**7**
21	6/13/12		1						1	2								1		2			1				1		1					1	1		1	**13**	**11**
21	6/14/12			2					2				1							1							1	1	1					3			1	**13**	**9**
22	6/13/12																																					1	**1**	**1**
22	6/14/12					1				2																													**3**	**2**
23	6/13/12					1														2														1			2	**6**	**4**
23	6/14/12													1						3			2							1			1	1			1	**10**	**7**
24	6/12/12																			1			2		1			1						1				**6**	**5**
24	6/13/12		1		1	1								1			2			1			2											2		1		**12**	**9**
25	6/12/12					1			2	2													1	1		1												**8**	**6**
25	6/13/12					2												1		1						2												**6**	**4**
26	6/12/12																	1								1								1				**3**	**3**
26	6/13/12					2																	1			5	1	1										**10**	**5**
27	6/12/12	1			1				1														3					1						2				**9**	**6**
27	6/13/12		2			1				2										1			4						2					1			1	**14**	**8**
28	6/12/12																			1			1			1												**3**	**3**

Table 2-1a. Bird Survey Point Data - June 2012

Rio Tinto Eagle Mine

Survey Point	Date	Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Blue-headed Vireo	Brown Thrasher	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Eastern (Ruff-sided) Towhee	Hermit Thrush	Least Flycatcher	Mourning Dove	Nashville Warbler	Northern (Yellow-shafted) Flicker	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Ruby-crowned Kinglet	Sandhill Crane	Song Sparrow	Spruce Grouse	Vesper Sparrow	Whip-poor-will	White-throated Sparrow	White-winged Crossbill	Willow Flycatcher	Yellow-rumped Warbler	**Total Count**	**Species Richness**
28	6/13/12		*1*			*1*											*1*	*2*		*2*																		*2*	**9**	**6**
29	6/13/12		*1*										*1*				*2*	*1*					*3*						*2*						*1*		*1*	*1*	**13**	**9**
29	6/14/12		*1*							*1*			*1*							*1*			*4*												*2*				**10**	**6**
30	6/12/12					*2*							*2*							*1*			*2*		*1*										*3*				**11**	**6**
30	6/13/12					*1*		*1*					*1*							*2*			*2*		*1*										*1*			*1*	**10**	**8**
31	6/12/12									*1*	*1*		*1*			*1*							*2*												*1*				**7**	**6**
31	6/13/12				*1*	*1*														*1*			*1*				*1*	*1*	*1*										**7**	**7**
		2	**15**	**2**	**3**	**19**	**1**	**1**	**9**	**16**	**1**	**2**	**7**	**18**	**4**	**7**	**14**	**42**	**1**	**75**	**1**	**1**	**91**	**1**	**5**	**30**	**9**	**9**	**11**	**1**	**1**	**3**	**3**	**2**	**44**	**1**	**2**	**25**	**479**	**37**

Mean of Species Richness per Survey Point per Day = 6
Median of Species Richness per Survey Point per Day = 6
Mean Count per Species = 13
Median Count per Species = 4

Table 2-1b. Bird Species Abundance Rankings - June 2012

Rio Tinto Eagle Mine

Common Name	Scientific Name	Count	Relative Abundance
Nashville Warbler	*Vermivora ruficapilla*	91	19.0%
Hermit Thrush	*Catharus guttatus*	75	15.7%
White-throated Sparrow	*Zonotrichia albicollis*	44	9.2%
Dark-eyed (slate-colored) Junco	*Junco hyemalis*	42	8.8%
Pine Warbler	*Dendroica pinus*	30	6.3%
Yellow-rumped Warbler	*Dendroica coronata*	25	5.2%
American Robin	*Turdus migratorius*	19	4.0%
Chipping Sparrow	*Spizella passerina*	18	3.8%
Blue Jay	*Cyanocitta cristata*	16	3.3%
American Crow	*Corvus brachyrhynchos*	15	3.1%
Common Raven	*Corvus corax*	14	2.9%
Ruby-crowned Kinglet	*Regulus calendula*	11	2.3%
Black-capped Chickadee	*Poecile atricapilla*	9	1.9%
Red-breasted Nuthatch	*Sitta canadensis*	9	1.9%
Red-eyed Vireo	*Vireo olivaceus*	9	1.9%
Chestnut-sided Warbler	*Dendroica pensylvanica*	7	1.5%
Common Nighthawk	*Chordeiles minor*	7	1.5%
Ovenbird	*Seiurus aurocapilla*	5	1.0%
Clay-colored Sparrow	*Spizella pallida*	4	0.8%
American Redstart	*Setophaga ruticilla*	3	0.6%
Spruce Grouse	*Falcipennis canadensis*	3	0.6%
Vesper Sparrow	*Pooecetes gramineus*	3	0.6%
Alder Flycatcher	*Empidonax alnorum*	2	0.4%
American Goldfinch	*Carduelis tristis*	2	0.4%
Brown Thrasher	*Toxostoma rufum*	2	0.4%
Whip-poor-will	*Caprimulgus vociferus*	2	0.4%
Willow Flycatcher	*Empidonax traillii*	2	0.4%
American Woodcock	*Scolopax minor*	1	0.2%
Belted Kingfisher	*Megaceryle alcyon*	1	0.2%
Blue-headed Vireo	*Vireo solitarius*	1	0.2%
Eastern (Ruff-sided) Towhee	*Pipilo erythrophthalmus*	1	0.2%
Least Flycatcher	*Empidonax minimus*	1	0.2%
Mourning Dove	*Zenaida macroura*	1	0.2%
Northern (Yellow-shafted) Flicker	*Colaptes auratus*	1	0.2%
Sandhill Crane	*Grus canadensis*	1	0.2%
Song Sparrow	*Melospiza melodia*	1	0.2%
White-winged Crossbill	*Loxia leucoptera*	1	0.2%

Total Count = 479
Mean Count per Species = 13
Median Count per Species = 4

Table 2-2a. Bird Survey Point Data - September 2012

Rio Tinto Eagle Mine

Survey Point	Date	American Crow	American Goldfinch	American Robin	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Canada Goose	Chipping Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Downy Woodpecker	Gray Jay	Hermit Thrush	Northern (Yellow-shafted) Flicker	Red-breasted Nuthatch	Red-winged Blackbird	White-breasted Nuthatch	White-throated Sparrow	Winter Wren	**Total Count**	**Species Richness**
1	9/27/12											*3*					*1*					**4**	**2**
1	9/28/12	*2*	*1*	*1*			*2*															**6**	**4**
2	9/27/12						*1*	*36*				*5*						*1*				**43**	**4**
2	9/28/12	*3*		*2*		*2*						*2*										**9**	**4**
3	9/27/12			*2*		*2*	*1*					*6*										**11**	**4**
3	9/28/12	*1*																				**1**	**1**
11	9/27/12		*2*				*2*	*2*				*3*										**9**	**4**
11	9/28/12					*1*	*1*		*1*													**3**	**3**
12	9/27/12					*3*						*2*					*1*					**6**	**3**
12	9/28/12			*1*			*1*					*2*					*1*					**5**	**4**
13	9/27/12					*7*	*2*					*1*									*1*	**11**	**4**
13	9/28/12	*2*	*3*				*2*					*1*										**8**	**4**
14	9/27/12		*1*				*1*					*2*					*1*					**5**	**4**
14	9/28/12	*2*					*2*								*1*							**5**	**3**
21	9/27/12	*3*				*1*	*1*				*2*	*4*					*1*					**12**	**6**
21	9/28/12	*2*									*2*											**4**	**2**
22	9/27/12					*2*	*2*				*3*	*3*					*1*					**11**	**5**
22	9/28/12	*1*				*1*				*1*						*1*						**4**	**4**
23	9/27/12	*1*	*1*	*1*		*2*	*2*				*1*	*10*		*1*						*1*		**20**	**9**
23	9/28/12						*4*					*7*										**11**	**2**
24	9/27/12	*2*	*4*				*2*				*1*			*1*								**10**	**5**

Table 2-2a. Bird Survey Point Data - September 2012

Rio Tinto Eagle Mine

Survey Point	Date	American Crow	American Goldfinch	American Robin	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Canada Goose	Chipping Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Downy Woodpecker	Gray Jay	Hermit Thrush	Northern (Yellow-shafted) Flicker	Red-breasted Nuthatch	Red-winged Blackbird	White-breasted Nuthatch	White-throated Sparrow	Winter Wren	**Total Count**	**Species Richness**
24	9/28/12	*1*	*5*	*4*	*1*	*6*	*3*				*1*	*1*										**22**	**8**
25	9/27/12					*3*					*1*	*1*	*1*									**6**	**4**
25	9/28/12		*1*			*7*	*1*														*1*	**10**	**4**
26	9/27/12								*1*			*2*										**3**	**2**
26	9/28/12						*1*															**1**	**1**
27	9/27/12	*2*				*1*			*1*		*1*	*1*										**6**	**5**
27	9/28/12					*1*	*2*					*5*	*1*							*3*		**12**	**5**
28	9/27/12		*2*				*1*		*1*													**4**	**3**
28	9/28/12	*2*				*2*	*1*				*2*					*1*					*1*	**9**	**6**
29	9/27/12	*1*				*2*													*1*	*1*		**5**	**4**
29	9/28/12	*1*	*3*	*1*			*1*				*2*					*2*	*2*					**12**	**7**
30	9/27/12	*1*				*1*	*2*															**4**	**3**
30	9/28/12					*1*	*2*										*1*					**4**	**3**
31	9/27/12		*3*									*4*	*1*									**8**	**3**
31	9/28/12		*1*				*1*						*1*								*3*	**6**	**4**
		27	**27**	**12**	**1**	**45**	**41**	**38**	**4**	**1**	**16**	**65**	**4**	**2**	**1**	**4**	**9**	**1**	**1**	**5**	**6**	**310**	**20**

Mean of Species Richness per Survey Point per Day = 4
Median of Species Richness per Survey Point per Day = 4
Mean Count per Species = 16
Median Count per Species = 6

Table 2-2b. Bird Species Abundance Rankings - September 2012

Rio Tinto Eagle Mine

Common Name	Scientific Name	Count	Relative Abundance
Dark-eyed (slate-colored) Junco	*Junco hyemalis*	65	21.0%
Black-capped Chickadee	*Poecile atricapilla*	45	14.5%
Blue Jay	*Cyanocitta cristata*	41	13.2%
Canada Goose	*Branta canadensis*	38	12.3%
American Crow	*Corvus brachyrhynchos*	27	8.7%
American Goldfinch	*Carduelis tristis*	27	8.7%
Common Raven	*Corvus corax*	16	5.2%
American Robin	*Turdus migratorius*	12	3.9%
Red-breasted Nuthatch	*Sitta canadensis*	9	2.9%
Winter Wren	*Troglodytes troglodytes*	6	1.9%
White-throated Sparrow	*Zonotrichia albicollis*	5	1.6%
Chipping Sparrow	*Spizella passerina*	4	1.3%
Downy Woodpecker	*Picoides pubescens*	4	1.3%
Northern (Yellow-shafted) Flicker	*Colaptes auratus*	4	1.3%
Gray Jay	*Perisoreus canadensis*	2	0.6%
Belted Kingfisher	*Megaceryle alcyon*	1	0.3%
Common Nighthawk	*Chordeiles minor*	1	0.3%
Hermit Thrush	*Catharus guttatus*	1	0.3%
Red-winged Blackbird	*Agelaius phoeniceus*	1	0.3%
White-breasted Nuthatch	*Sitta carolinensis*	1	0.3%

Total Count = 310
Mean Count per Species = 16
Median Count per Species = 6

Table 2-3. Bird Species Abundance Rankings - June and September Combined, 2012

Rio Tinto Eagle Mine

Common Name	Scientific Name	Count	Relative Abundance
Dark-eyed (slate-colored) Junco	*Junco hyemalis*	107	13.6%
Nashville Warbler	*Vermivora ruficapilla*	91	11.5%
Hermit Thrush	*Catharus guttatus*	76	9.6%
Blue Jay	*Cyanocitta cristata*	57	7.2%
Black-capped Chickadee	*Poecile atricapilla*	54	6.8%
White-throated Sparrow	*Zonotrichia albicollis*	49	6.2%
American Crow	*Corvus brachyrhynchos*	42	5.3%
Canada Goose	*Branta canadensis*	38	4.8%
American Robin	*Turdus migratorius*	31	3.9%
Common Raven	*Corvus corax*	30	3.8%
Pine Warbler	*Dendroica pinus*	30	3.8%
American Goldfinch	*Carduelis tristis*	29	3.7%
Yellow-rumped Warbler	*Dendroica coronata*	25	3.2%
Chipping Sparrow	*Spizella passerina*	22	2.8%
Red-breasted Nuthatch	*Sitta canadensis*	18	2.3%
Ruby-crowned Kinglet	*Regulus calendula*	11	1.4%
Red-eyed Vireo	*Vireo olivaceus*	9	1.1%
Common Nighthawk	*Chordeiles minor*	8	1.0%
Chestnut-sided Warbler	*Dendroica pensylvanica*	7	0.9%
Winter Wren	*Troglodytes troglodytes*	6	0.8%
Northern (Yellow-shafted) Flicker	*Colaptes auratus*	5	0.6%
Ovenbird	*Seiurus aurocapilla*	5	0.6%
Clay-colored Sparrow	*Spizella pallida*	4	0.5%
Downy Woodpecker	*Picoides pubescens*	4	0.5%
American Redstart	*Setophaga ruticilla*	3	0.4%
Spruce Grouse	*Falcipennis canadensis*	3	0.4%
Vesper Sparrow	*Pooecetes gramineus*	3	0.4%
Alder Flycatcher	*Empidonax alnorum*	2	0.3%
Belted Kingfisher	*Megaceryle alcyon*	2	0.3%
Brown Thrasher	*Toxostoma rufum*	2	0.3%
Gray Jay	*Perisoreus canadensis*	2	0.3%
Whip-poor-will	*Caprimulgus vociferus*	2	0.3%
Willow Flycatcher	*Empidonax traillii*	2	0.3%
American Woodcock	*Scolopax minor*	1	0.1%
Blue-headed Vireo	*Vireo solitarius*	1	0.1%
Eastern (Ruff-sided) Towhee	*Pipilo erythrophthalmus*	1	0.1%
Least Flycatcher	*Empidonax minimus*	1	0.1%
Mourning Dove	*Zenaida macroura*	1	0.1%
Red-winged Blackbird	*Agelaius phoeniceus*	1	0.1%
Sandhill Crane	*Grus canadensis*	1	0.1%
Song Sparrow	*Melospiza melodia*	1	0.1%
White-breasted Nuthatch	*Sitta carolinensis*	1	0.1%
White-winged Crossbill	*Loxia leucoptera*	1	0.1%

Total Count = 789
Mean Count per Species = 18
Median Count per Species = 5

Table 3. Small Mammal Survey Point Data - 2012

Rio Tinto Eagle Mine

		Caught in Sherman Live Trap(s)							Caught with Large Snap Trap				
Survey Point	Date	Boreal Redback Vole (*Clethrionomys gapperi*)	Least Chipmunk (*Tamias minimus*)	Northern Flying Squirrel (*Glaucomys sabrinus*)	Masked Shrew (*Sorex cinereus*)	Long-tailed Weasel (*Mustela frenata*)	Deer Mouse (*Peromyscus maniculatus*)	White-footed Mouse (*Peromyscus leucopus*)	Boreal Redback Vole (*Clethrionomys gapperi*)	Northern Flying Squirrel (*Glaucomys sabrinus*)	Deer Mouse (Peromyscus maniculatus)	**Total Count**	**Species Richness**
1	9/19/12						*2*		*1*			**3**	**2**
1	9/20/12	*1*					*2*					**3**	**2**
1	9/21/12	*1*					*2*					**3**	**2**
3	9/19/12											**0**	**0**
3	9/20/12											**0**	**0**
3	9/21/12											**0**	**0**
11	9/19/12											**0**	**0**
11	9/20/12	*1*										**1**	**1**
11	9/21/12											**0**	**0**
13	9/19/12	*1*										**1**	**1**
13	9/20/12	*1*			*1*							**2**	**2**
13	9/21/12	*1*	*1*									**2**	**2**
22	9/19/12											**0**	**0**
22	9/20/12											**0**	**0**
22	9/21/12							*1*				**1**	**1**
23	9/19/12											**0**	**0**
23	9/20/12											**0**	**0**
23	9/21/12		*1*		*1*							**2**	**2**
25	9/19/12							*1*				**1**	**1**
25	9/20/12							*1*				**1**	**1**

Table 3. Small Mammal Survey Point Data - 2012

Rio Tinto Eagle Mine

		Caught in Sherman Live Trap(s)							Caught with Large Snap Trap				
Survey Point	Date	Boreal Redback Vole (*Clethrionomys gapperi*)	Least Chipmunk (*Tamias minimus*)	Northern Flying Squirrel (*Glaucomys sabrinus*)	Masked Shrew (*Sorex cinereus*)	Long-tailed Weasel (*Mustela frenata*)	Deer Mouse (*Peromyscus maniculatus*)	White-footed Mouse (*Peromyscus leucopus*)	Boreal Redback Vole (*Clethrionomys gapperi*)	Northern Flying Squirrel (*Glaucomys sabrinus*)	Deer Mouse (Peromyscus maniculatus)	**Total Count**	**Species Richness**
25	9/21/12		*2*	*1*		*1*						**4**	**3**
27	9/19/12									*1*		**1**	**1**
27	9/20/12											**0**	**0**
27	9/21/12											**0**	**0**
29	9/19/12											**0**	**0**
29	9/20/12	*2*										**2**	**1**
29	9/21/12	*3*										**3**	**1**
31	9/19/12										*1*	**1**	**1**
31	9/20/12		*2*									**2**	**1**
31	9/21/12	*1*	*2*									**3**	**2**
		12	8	1	2	1	6	3	1	1	1	**36**	

Mean of Species Richness per Survey Point per Day = 1
Median of Species Richness per Survey Point per Day = 1
Mean Count per Species = 5
Median Count per Species = 3

Table 4. Frog and Toad Survey Point Data - 2012

Rio Tinto Eagle Mine

						Call Index Value (see below for details)*					
Survey Point	Survey Period	Date	Time	Temp (°F)	Wind Speed (MPH)	Northern Spring Peeper (*Pseudacris crucifer*)	Green Frog (*Rana clamitans*)	Mink Frog (*Rana sep-tentrionalis*)	American Toad (*Bufo americanus*)	Gray Treefrog (*Hyla versicolor*)	**Species Richness**
FT01	Early Spring	4/24/12	9:11 PM	47	0	*3*					**1**
FT02	Early Spring	4/24/12	8:51 PM	51	0	*3*					**1**
FT03	Early Spring	4/24/12	9:45 PM	45	0	*3*					**1**
FT01	Early Spring	5/2/12	9:44 PM	55	0	*3*			*1*		**2**
FT02	Early Spring	5/2/12	9:18 PM	57	0	*3*					**1**
FT03	Early Spring	5/2/12	8:45 PM	62	0	*3*					**1**
FT01	Late Spring	5/22/12	10:07 PM	59	0	*3*					**1**
FT02	Late Spring	5/22/12	9:45 PM	59	1	*3*					**1**
FT03	Late Spring	5/22/12	10:53 PM	59	0	*3*					**1**
FT01	Late Spring	5/23/12	10:15 PM	62	6	*3*					**1**
FT02	Late Spring	5/23/12	10:43 PM	60	6	*3*					**1**
FT03	Late Spring	5/23/12	9:33 PM	64	4	*3*	*1*			*1*	**3**

Table 4. Frog and Toad Survey Point Data - 2012

Rio Tinto Eagle Mine

						Call Index Value (see below for details)*					
Survey Point	Survey Period	Date	Time	Temp (°F)	Wind Speed (MPH)	Northern Spring Peeper (*Pseudacris crucifer*)	Green Frog (*Rana clamitans*)	Mink Frog (*Rana sep-tentrionalis*)	American Toad (*Bufo americanus*)	Gray Treefrog (*Hyla versicolor*)	**Species Richness**
FT01	Summer	6/28/12	9:48 PM	71	0-4		*1*				**1**
FT02	Summer	6/28/12	9:25 PM	73	0-5		*2*				**1**
FT03	Summer	6/28/12	9:00 PM	75	2-5		*2*	*2 adult mink frogs observed; none heard*			**1**

* 1 = Individuals can be counted and there is space between calls.
2 = Individuals can be counted but there is some overlapping of calls.
3 = Full chorus; calls are continuous and overlapping.

Mean of Species Richness per Survey Point per Day = 1
Median of Species Richness per Survey Point per Day = 1
Mean Call Index Value per Survey Point per Day = 3
Median Call Index Value per Survey Point per Day = 3
Median Call Index Value per Species = 1.5

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)								
					Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 12W	Plot 13W	Plot 26W
Acer rubrum	Red Maple	1	FAC	Yes			5			5	5		
Agrostis gigantea (A. alba)	Redtop	0	FACW	No							20		
Amelanchier sp.	Serviceberry	NA	NA	Yes				5					
Anemone quinquefolia	Wood Anemone	5	FAC*	Yes	5								
Brachyelytrum erectum	Short-glume Grass	7	[FACU]	Yes	5								
Calamagrostis canadensis	Blue-joint	3	OBL	Yes		5	20	10				65	
Carex arctata	Bear Sedge	3	[UPL]	Yes			5						
Carex lasiocarpa	Woolly-fruit Sedge	8	OBL	Yes		5							
Carex leptalea	Sedge	5	OBL	Yes	20								
Carex oligosperma	Few-seeded Sedge	10	OBL	Yes									10
Carex stricta	Strict Sedge	4	OBL	Yes	50	70						10	
Carex trisperma	Three-seeded Sedge	9	OBL	Yes						5			
Chamaedaphne calyculata	Leatherleaf	8	OBL	Yes									20
Cirsium palustre	European Swamp Thistle	0	[FACW+]	No	5								
Conyza canadensis	Horseweed	0	FAC-	Yes						5			
Coptis trifolia	Goldthread	5	FACW	Yes				5		10	5		
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	Yes				10	5		5		
Danthonia spicata	Poverty Grass	4	[UPL]	Yes					5				
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	Yes			20	5	10				
Diervilla lonicera	Bush-Honeysuckle	4	[UPL]	Yes					5				
Dryopteris intermedia	Intermediate Fern	5	FAC	Yes	5					15			
Epigaea repens	Trailing Arbutus	7	[UPL]	Yes				5					
Hieracium aurantiacum	Orange Hawkweed	0	[UPL]	No					15				
Hieracium caespitosum	Yellow Hawkweed	0	[UPL]	No				30					
Hieracium sp.	Hawkweed	0	[UPL]	No			5						
Iris versicolor	Varicolored Iris	5	OBL	Yes								5	
Kalmia polifolia	Swamp-laurel	10	OBL	Yes									10
Ledum groenlandicum	Labrador-Tea	8	OBL	Yes									45
Lysimachia quadrifolia	Four-leaf Loosestrife	8	UPL	Yes		5							
Maianthemum canadense	Canada Mayflower	4	FAC	Yes			5				5		
NA	Lichen	NA	NA	Yes						5			
NA	Moss	NA	NA	Yes			15	10					
Osmunda cinnamomea	Cinnamon Fern	5	FACW	Yes						80			

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)								
					Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 12W	Plot 13W	Plot 26W
Oxalis acetosella	Northern Wood-sorrel	7	[FACU]	Yes						5			
Phleum pratense	Timothy	0	FACU	No					5				
Populus tremuloides	Quaking Aspen	1	FAC	Yes				5					
Potentilla palustris	Marsh Cinquefoil	7	OBL	Yes		5							
Prunus serotina	Black Cherry	2	FACU	Yes				5					
Prunus virginiana	Choke Cherry	2	FAC-	Yes	5								
Pteridium aquilinum	Bracken Fern	0	FACU	Yes					5		5		
Rubus pubescens	Dwarf Raspberry	4	FACW+	Yes	10								
Rubus setosus	Setose Blackberry	3	FACW-	Yes			10	5	5				
Rubus sp.	Raspberry	NA	NA	NA							5		
Sarracenia purpurea	Pitcher-plant	10	OBL	Yes									5
Solidago juncea	Early Goldenrod	3	[UPL]	Yes				5					
Sphagnum sp.	Sphagnum Moss	NA	OBL	Yes						20			95
Thalictrum dasycarpum	Hairy-fruit Meadow-rue	3	FACW-	Yes	5								
Trientalis borealis	Starflower	5	FAC+	Yes			5				5		
Utricularia sp.	Bladderwort	0	OBL	Yes		5							
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	Yes				45	30		5		
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	Yes					5		10		
NA	Dead Vegetation	NA	NA	NA		5	15	5				50	
NA	Duff / Bare Soil	NA	NA	NA	15	10	10		5	50	30	30	
Total Number of Species =					**9**	**6**	**9**	**13**	**10**	**9**	**10**	**3**	**6**
Total Number of Native Species =					**8**	**6**	**8**	**12**	**8**	**9**	**8**	**3**	**6**
Mean Wetland Indicator Value (W) =					**-1.8**	**-3.3**	**0.8**	**1.2**	**2.9**	**-1.3**	**-0.1**	**-5.0**	**-5.0**
Mean Coefficient of Conservatism (C) =					**3.9**	**5.0**	**2.8**	**3.1**	**3.1**	**3.6**	**2.9**	**4.0**	**7.7**

Table 6b. Woody Species Wetland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Woody Species Stems Per Permanent 30-Foot Radius Circular Plot								
					Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 12W	Plot 13W	Plot 26W
Abies balsamea	Balsam Fir	3	FACW	Yes	23		9	70	18	16		2	
Acer rubrum	Red Maple	1	FAC	Yes	43		50	20	16	193	28		
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	Yes		51	4						
Amelanchier sp.	Serviceberry	NA	NA	Yes	4		8	5	8	2		1	
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	Yes								1	
Betula papyrifera	Paper Birch	2	FACU+	Yes			7	7	9		11		
Corylus cornuta	Beaked Hazelnut	5	UPL	Yes	12				7				
Larix laricina	Tamarack	5	FACW	Yes		1				10		4	8
Lonicera canadensis	Canada Honeysuckle	5	FACU	Yes	7								
Nemopanthus mucronatus	Mountain Holly	7	OBL	Yes	1					5		1	
Picea mariana	Black Spruce	6	FACW	Yes	15			36	15	24	1	12	24
Pinus banksiana	Jack Pine	5	FACU	Yes			4	20	13		2	1	
Pinus resinosa	Red Pine	6	FACU	Yes			2						
Pinus strobus	White Pine	3	FACU	Yes	1						1		1
Populus tremuloides	Quaking Aspen	1	FAC	Yes			8		5		1		
Prunus pensylvanica	Bird Cherry	3	FACU-	Yes			1		7				
Prunus serotina	Black Cherry	2	FACU	Yes	11		32	22	11		5		
Prunus virginiana	Choke Cherry	2	FAC-	Yes	30								
Salix bebbiana	Bebb Willow	1	FACW+	Yes							1		
Salix discolor	Pussy Willow	1	FACW	Yes			1				1		
Salix humilis	Prairie Willow	4	FACU	Yes	78			1					
Total Number of Species =					**11**	**2**	**11**	**8**	**10**	**6**	**9**	**7**	**3**
Total Number of Native Species =					**11**	**2**	**11**	**8**	**10**	**6**	**9**	**7**	**3**
Mean Wetland Indicator Value (W) =					**0.6**	**-4.0**	**0.4**	**0.6**	**1.1**	**-2.3**	**0.1**	**-1.9**	**-1.0**
Mean Coefficient of Conservatism (C) =					**3.5**	**5.0**	**2.6**	**2.9**	**2.8**	**3.7**	**2.4**	**4.4**	**4.7**

Table 6c. Overall Wetland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Abies balsamea	Balsam Fir	3	FACW	-3	Tree	Yes
Acer rubrum	Red Maple	1	FAC	0	Tree	Yes
Agrostis gigantea (A. alba)	Redtop	0	FACW	-3	Herb	No
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	-5	Shrub	Yes
Amelanchier sp.	Serviceberry	NA	NA		S/T	Yes
Anemone quinquefolia	Wood Anemone	5	FAC*	0	Herb	Yes
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	-2	Shrub	Yes
Betula papyrifera	Paper Birch	2	FACU+	2	Tree	Yes
Brachyelytrum erectum	Short-glume Grass	7	[FACU]	3	Herb	Yes
Calamagrostis canadensis	Blue-joint	3	OBL	-5	Herb	Yes
Carex arctata	Bear Sedge	3	[UPL]	5	Herb	Yes
Carex lasiocarpa	Woolly-fruit Sedge	8	OBL	-5	Herb	Yes
Carex leptalea	Sedge	5	OBL	-5	Herb	Yes
Carex oligosperma	Few-seeded Sedge	10	OBL	-5	Herb	Yes
Carex stricta	Strict Sedge	4	OBL	-5	Herb	Yes
Carex trisperma	Three-seeded Sedge	9	OBL	-5	Herb	Yes
Chamaedaphne calyculata	Leatherleaf	8	OBL	-5	Shrub	Yes
Cirsium palustre	European Swamp Thistle	0	[FACW+]	-4	Herb	No
Conyza canadensis	Horseweed	0	FAC-	1	Herb	Yes
Coptis trifolia	Goldthread	5	FACW	-3	Herb	Yes
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	0	Herb	Yes
Corylus cornuta	Beaked Hazelnut	5	UPL	5	Shrub	Yes
Danthonia spicata	Poverty Grass	4	[UPL]	5	Herb	Yes
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	5	Herb	Yes
Diervilla lonicera	Bush-Honeysuckle	4	[UPL]	5	Shrub	Yes
Dryopteris intermedia	Intermediate Fern	5	FAC	0	Herb	Yes
Epigaea repens	Trailing Arbutus	7	[UPL]	5	Herb	Yes
Hieracium aurantiacum	Orange Hawkweed	0	[UPL]	5	Herb	No
Hieracium caespitosum	Yellow Hawkweed	0	[UPL]	5	Herb	No
Hieracium sp.	Hawkweed	0	[UPL]	5	Herb	No
Iris versicolor	Varicolored Iris	5	OBL	-5	Herb	Yes
Kalmia polifolia	Swamp-laurel	10	OBL	-5	Shrub	Yes
Larix laricina	Tamarack	5	FACW	-3	Tree	Yes
Ledum groenlandicum	Labrador-Tea	8	OBL	-5	Shrub	Yes
Lonicera canadensis	Canada Honeysuckle	5	FACU	3	Shrub	Yes
Lysimachia quadrifolia	Four-leaf Loosestrife	8	UPL	5	Herb	Yes
Maianthemum canadense	Canada Mayflower	4	FAC	0	Herb	Yes
NA	Lichen	NA	NA		Lichen	Yes
NA	Moss	NA	NA		Moss	Yes
Nemopanthus mucronatus	Mountain Holly	7	OBL	-5	Shrub	Yes
Osmunda cinnamomea	Cinnamon Fern	5	FACW	-3	Herb	Yes
Oxalis acetosella	Northern Wood-sorrel	7	[FACU]	3	Herb	Yes
Phleum pratense	Timothy	0	FACU	3	Herb	No
Picea mariana	Black Spruce	6	FACW	-3	Tree	Yes
Pinus banksiana	Jack Pine	5	FACU	3	Tree	Yes
Pinus resinosa	Red Pine	6	FACU	3	Tree	Yes
Pinus strobus	White Pine	3	FACU	3	Tree	Yes
Populus tremuloides	Quaking Aspen	1	FAC	0	Tree	Yes
Potentilla palustris	Marsh Cinquefoil	7	OBL	-5	Herb	Yes

Table 6c. Overall Wetland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Prunus pensylvanica	Bird Cherry	3	FACU-	4	Tree	Yes
Prunus serotina	Black Cherry	2	FACU	3	Tree	Yes
Prunus virginiana	Choke Cherry	2	FAC-	1	Shrub	Yes
Pteridium aquilinum	Bracken Fern	0	FACU	3	Herb	Yes
Rubus pubescens	Dwarf Raspberry	4	FACW+	-4	Herb	Yes
Rubus setosus	Setose Blackberry	3	FACW-	-2	Shrub	Yes
Rubus sp.	Raspberry	NA	NA	-2	Herb	NA
Salix bebbiana	Bebb Willow	1	FACW+	-4	Shrub	Yes
Salix discolor	Pussy Willow	1	FACW	-3	Shrub	Yes
Salix humilis	Prairie Willow	4	FACU	3	Shrub	Yes
Sarracenia purpurea	Pitcher-plant	10	OBL	-5	Herb	Yes
Solidago juncea	Early Goldenrod	3	[UPL]	5	Herb	Yes
Sphagnum sp.	Sphagnum Moss	NA	OBL	-5	Moss	Yes
Thalictrum dasycarpum	Hairy-fruit Meadow-rue	3	FACW-	-2	Herb	Yes
Trientalis borealis	Starflower	5	FAC+	-1	Herb	Yes
Utricularia sp.	Bladderwort	0	OBL	-5	Herb	Yes
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	2	Herb	Yes
NA	Dead Vegetation	NA	NA	NA	NA	NA
NA	Duff / Bare Soil	NA	NA	NA	NA	NA

Total Number of Species =	**67**
Total Number of Native Species =	**60**
Mean Wetland Indicator Value (W) =	**-0.4**
Mean Coefficient of Conservatism (C) =	**4.2**
Floristic Quality Index (FQI) =	**34.5**

Table 7-1a. Herbaceous Species Upland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)																	
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Abies balsamea	Balsam Fir	3	FACW	Yes																5	5	
Acer rubrum	Red Maple	1	FAC	Yes							5		5				5	10		5	10	
Amelanchier sp.	Serviceberry	NA	NA	Yes							5		5		5			5				
Aralia hispida	Hispid Aralia	3	[UPL]	Yes			5															
Carex lucorum	Lucorum Sedge	4	[UPL]	Yes			10	40														
Carex sp.	Unidentified Sedge	NA	NA	Yes											5							
Carex stricta	Strict Sedge	4	OBL	Yes														80				
Chamaedaphne calyculata	Leatherleaf	8	OBL	Yes														10				
Clintonia borealis	Blue Beadlily	5	FAC+	Yes											10					5		
Coptis trifolia	Goldthread	5	FACW	Yes											5			5		5	5	
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	Yes											5			5		5	5	
Cypripedium acaule	Pink Lady-slipper	5	FACW	Yes													5					
Danthonia spicata	Poverty Grass	4	[UPL]	Yes			20						5	5					20			
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	Yes		5		5				5		15		5	5		5			5
Epigaea repens	Trailing Arbutus	7	[UPL]	Yes	5	15					5	5				5						
Gaultheria hispidula	Snowberry	8	FACW	Yes														5				
Gaultheria procumbens	Wintergreen	5	FACU	Yes	10				15				5	5	5		10	5		5		
Iris versicolor	Varicolored Iris	5	OBL	Yes														5				
Kalmia polifolia	Swamp-laurel	10	OBL	Yes											5							
Ledum groenlandicum	Labrador-Tea	8	OBL	Yes											25			10				
Linnaea borealis	Twinflower	6	FAC	Yes	5																	
Maianthemum canadense	Canada Mayflower	4	FAC	Yes	5	5		5	5	5	10										5	5
Melampyrum lineare	Cow-wheat	6	FAC-	Yes															5			
NA	Lichen	NA	NA	Yes	5	90		10				10			5	10						
NA	Moss	NA	NA	Yes	10				90		80			10		60	5		5	60		20
Nemopanthus mucronatus	Mountain Holly	7	OBL	Yes											5							
Panicum sp.	Panicum Grass	NA	NA	Yes			5															
Pinus strobus	White Pine	3	FACU	Yes									5									
Populus tremuloides	Quaking Aspen	1	FAC	Yes									20									
Prunus serotina	Black Cherry	2	FACU	Yes										5						5	5	
Pteridium aquilinum	Bracken Fern	0	FACU	Yes	60	5		5	10		5	25	60	55		5	15		60	5		40
Sphagnum sp.	Sphagnum Moss	NA	OBL	Yes						95					25			80				
Trientalis borealis	Starflower	5	FAC+	Yes	5						5								5			

Table 7-1a. Herbaceous Species Upland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)																		
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	Yes	20	5	10	20	10	85	20	50	25		45	20	20	5	5		5	30
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	Yes		15			20			5		10	5					20	10	
NA	Dead Vegetation	NA	NA	NA																		
NA	Duff / Bare Soil	NA	NA	NA	10						5	45	55	55	5	5	55		30	40	60	50
Total Number of Species =					**9**	**7**	**5**	**6**	**6**	**3**	**8**	**6**	**8**	**7**	**13**	**6**	**7**	**12**	**7**	**10**	**8**	**5**
Total Number of Native Species =					**9**	**7**	**5**	**6**	**6**	**3**	**8**	**6**	**8**	**7**	**13**	**6**	**7**	**12**	**7**	**10**	**8**	**5**
Mean Wetland Indicator Value (W) =					**1.4**	**2.6**	**3.6**	**2.7**	**1.8**	**-0.7**	**1.3**	**3.0**	**2.1**	**3.0**	**-1.2**	**2.7**	**1.6**	**-2.1**	**2.3**	**0.4**	**0.3**	**2.2**
Mean Coefficient of Conservatism (C) =					**3.4**	**3.6**	**3.0**	**3.0**	**2.8**	**2.7**	**2.6**	**3.5**	**2.3**	**3.0**	**4.2**	**2.8**	**3.0**	**4.5**	**3.6**	**3.1**	**3.6**	**2.8**

Table 7-1b. Woody Species Upland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Woody Species Stems Per Permanent 30-Foot Radius Circular Plot																	
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Abies balsamea	Balsam Fir	3	FACW	Yes	9	1			1		2		2	1	4	2	6		1	16	26	20
Acer rubrum	Red Maple	1	FAC	Yes	42				5			8	2	6	23	6	17	80	10	13	9	19
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	Yes														33				
Amelanchier sp.	Serviceberry	NA	NA	Yes	8				1		1		3	3	5			11	15	4		2
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	Yes											1							
Betula papyrifera	Paper Birch	2	FACU+	Yes										1				1	1	1	1	1
Corylus cornuta	Beaked Hazelnut	5	UPL	Yes																	1	
Larix laricina	Tamarack	5	FACW	Yes						5					2			8				
Ledum groenlandicum	Labrador-Tea	8	OBL	Yes											1							
Nemopanthus mucronatus	Mountain Holly	7	OBL	Yes											12			11		4		
Picea glauca	White Spruce	3	FACU	Yes									1									
Picea mariana	Black Spruce	6	FACW	Yes	16	24			23	53	24	23		1	23	10		74	1	17		25
Pinus banksiana	Jack Pine	5	FACU	Yes	18	2	16	25	24	32	10	11	10	16		10	10		7			11
Pinus resinosa	Red Pine	6	FACU	Yes															8			
Pinus strobus	White Pine	3	FACU	Yes	2				1			2	2	1	1	3	4		2	3	4	
Populus tremuloides	Quaking Aspen	1	FAC	Yes									43	1			2		47			1
Prunus pensylvanica	Bird Cherry	3	FACU-	Yes										5					2			
Prunus serotina	Black Cherry	2	FACU	Yes									20	14		3			19	1		3
Prunus virginiana	Choke Cherry	2	FAC-	Yes															1	1		
Salix humilis	Prairie Willow	4	FACU	Yes	8						1	2										
Total Number of Species =					**7**	**3**	**1**	**1**	**6**	**3**	**5**	**5**	**8**	**10**	**9**	**6**	**5**	**7**	**12**	**9**	**5**	**8**
Total Number of Native Species =					**7**	**3**	**1**	**1**	**6**	**3**	**5**	**5**	**8**	**10**	**9**	**6**	**5**	**7**	**12**	**9**	**5**	**8**
Mean Wetland Indicator Value (W) =					**0.4**	**-1.0**	**3.0**	**3.0**	**0.0**	**-1.0**	**0.0**	**1.2**	**1.1**	**0.9**	**-2.0**	**0.5**	**0.6**	**-2.0**	**1.1**	**-0.2**	**1.4**	**0.3**
Mean Coefficient of Conservatism (C) =					**3.1**	**4.7**	**5.0**	**5.0**	**3.0**	**5.3**	**3.6**	**3.8**	**2.3**	**2.6**	**4.2**	**3.3**	**2.6**	**3.7**	**2.8**	**2.9**	**2.8**	**2.5**

Table 7-1c. Overall Upland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Abies balsamea	Balsam Fir	3	FACW	-3	Tree	Yes
Acer rubrum	Red Maple	1	FAC	0	Tree	Yes
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	-5	Shrub	Yes
Amelanchier sp.	Serviceberry	NA	NA		S/T	Yes
Aralia hispida	Hispid Aralia	3	[UPL]	5	Herb	Yes
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	-2	Shrub	Yes
Betula papyrifera	Paper Birch	2	FACU+	2	Tree	Yes
Carex lucorum	Lucorum Sedge	4	[UPL]	5	Herb	Yes
Carex sp.	Unidentified Sedge	NA	NA		Herb	Yes
Carex stricta	Strict Sedge	4	OBL	-5	Herb	Yes
Chamaedaphne calyculata	Leatherleaf	8	OBL	-5	Shrub	Yes
Clintonia borealis	Blue Beadlily	5	FAC+	-1	Herb	Yes
Coptis trifolia	Goldthread	5	FACW	-3	Herb	Yes
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	0	Herb	Yes
Corylus cornuta	Beaked Hazelnut	5	UPL	5	Shrub	Yes
Cypripedium acaule	Pink Lady-slipper	5	FACW	-3	Herb	Yes
Danthonia spicata	Poverty Grass	4	[UPL]	5	Herb	Yes
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	5	Herb	Yes
Epigaea repens	Trailing Arbutus	7	[UPL]	5	Herb	Yes
Gaultheria hispidula	Snowberry	8	FACW	-3	Herb	Yes
Gaultheria procumbens	Wintergreen	5	FACU	3	Herb	Yes
Iris versicolor	Varicolored Iris	5	OBL	-5	Herb	Yes
Kalmia polifolia	Swamp-laurel	10	OBL	-5	Shrub	Yes
Larix laricina	Tamarack	5	FACW	-3	Tree	Yes
Ledum groenlandicum	Labrador-Tea	8	OBL	-5	Shrub	Yes
Linnaea borealis	Twinflower	6	FAC	0	Herb	Yes
Maianthemum canadense	Canada Mayflower	4	FAC	0	Herb	Yes
Melampyrum lineare	Cow-wheat	6	FAC-	1	Herb	Yes
NA	Lichen	NA	NA		Lichen	Yes
NA	Moss	NA	NA		Moss	Yes
Nemopanthus mucronatus	Mountain Holly	7	OBL	-5	Shrub	Yes
Panicum sp.	Panicum Grass	NA	NA		Herb	Yes
Picea glauca	White Spruce	3	FACU	3	Tree	Yes
Picea mariana	Black Spruce	6	FACW	-3	Tree	Yes
Pinus banksiana	Jack Pine	5	FACU	3	Tree	Yes
Pinus resinosa	Red Pine	6	FACU	3	Tree	Yes
Pinus strobus	White Pine	3	FACU	3	Tree	Yes
Populus tremuloides	Quaking Aspen	1	FAC	0	Tree	Yes
Prunus pensylvanica	Bird Cherry	3	FACU-	4	Tree	Yes
Prunus serotina	Black Cherry	2	FACU	3	Tree	Yes
Prunus virginiana	Choke Cherry	2	FAC-	1	Shrub	Yes
Pteridium aquilinum	Bracken Fern	0	FACU	3	Herb	Yes
Salix humilis	Prairie Willow	4	FACU	3	Shrub	Yes
Sphagnum sp.	Sphagnum Moss	NA	OBL	-5	Moss	Yes
Trientalis borealis	Starflower	5	FAC+	-1	Herb	Yes
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	3	Shrub	Yes

Table 7-1c. Overall Upland Vegetative Survey Data - June 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	2	Herb	Yes
NA	Dead Vegetation	NA	NA	NA	NA	NA
NA	Duff / Bare Soil	NA	NA	NA	NA	NA

Total Number of Species =	**47**
Total Number of Native Species =	**47**
Mean Wetland Indicator Value (W) =	**0.1**
Mean Coefficient of Conservatism (C) =	**4.6**
Floristic Quality Index (FQI) =	**31.8**

Table 7-2a. Herbaceous Species Upland Vegetative Survey Data - September 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)																	
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Abies balsamea	Balsam Fir	3	FACW	Yes																5	5	
Acer rubrum	Red Maple	1	FAC	Yes	5							5	5				5	15			10	
Amelanchier sp.	Serviceberry	NA	NA	Yes							5		5		5			5				
Aralia hispida	Hispid Aralia	3	[UPL]	Yes			5															
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	Yes														5				
Carex lucorum	Lucorum Sedge	4	[UPL]	Yes			10	40														
Carex sp.	Unidentified Sedge	NA	NA	Yes											5							
Carex stricta	Strict Sedge	4	OBL	Yes														45				
Chamaedaphne calyculata	Leatherleaf	8	OBL	Yes						5								10				
Clintonia borealis	Blue Beadlily	5	FAC+	Yes											10					5		
Conyza canadensis	Horseweed	0	FAC-	Yes			5															
Coptis trifolia	Goldthread	5	FACW	Yes											5			5		5	5	
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	Yes											5			5		5	5	
Cypripedium acaule	Pink Lady-slipper	5	FACW	Yes													5					
Danthonia spicata	Poverty Grass	4	[UPL]	Yes			20						5	5					25			
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	Yes		5		5				5		15		5	10		15			5
Epigaea repens	Trailing Arbutus	7	[UPL]	Yes	5	15					10	5				5						
Gaultheria hispidula	Snowberry	8	FACW	Yes														5				
Gaultheria procumbens	Wintergreen	5	FACU	Yes	10				15	5			5	5	10		10	5		5		
Graminoid sp.	Unidentified Grass	NA	NA	Yes							5											
Iris versicolor	Varicolored Iris	5	OBL	Yes														5				
Kalmia polifolia	Swamp-laurel	10	OBL	Yes											5							
Ledum groenlandicum	Labrador-Tea	8	OBL	Yes											20			10				
Linnaea borealis	Twinflower	6	FAC	Yes	5																	
Lycopodium digitatum (Diphasiastrum)	Digitate Clubmoss	3	FACU+	Yes	5																	
Maianthemum canadense	Canada Mayflower	4	FAC	Yes	5	5		5	5	5	5		5								5	5
Melampyrum lineare	Cow-wheat	6	FAC-	Yes															5			
NA	Lichen	NA	NA	Yes	5	90		10	5			10		5	5	5						
NA	Moss	NA	NA	Yes	10				90		80	5	5	10		50	5		5	60		20
Nemopanthus mucronatus	Mountain Holly	7	OBL	Yes											5							
Panicum depauperatum	Depauperate Panicum-grass	4	[UPL]	Yes			5															
Panicum sp.	Panicum Grass	NA	NA	Yes			5															
Pinus strobus	White Pine	3	FACU	Yes									5									

Table 7-2a. Herbaceous Species Upland Vegetative Survey Data - September 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)																	
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Populus tremuloides	Quaking Aspen	1	FAC	Yes									25									
Prunus serotina	Black Cherry	2	FACU	Yes										5						5	5	
Pteridium aquilinum	Bracken Fern	0	FACU	Yes	25	10		5	10		5	45	40	95		5	45		60	5		30
Rubus hispidus	Swamp Dewberry	4	FACW	Yes														5				
Smilacina trifolia	Three-leaf False Solomon's-seal	10	OBL	Yes											5							
Sphagnum sp.	Sphagnum Moss	NA	OBL	Yes						95					30			90				
Trientalis borealis	Starflower	5	FAC+	Yes							5								5			
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	Yes	10	20	15	80	10	60	40	45	45		45	15	15	5	5		5	20
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	Yes		15			20	5		5		10	5					25	10	
NA	Dead Vegetation	NA	NA	NA																		
NA	Duff / Bare Soil	NA	NA	NA	15			5		5	5	15	50	55	5	10	50		20	40	60	50
Total Number of Species =					**10**	**7**	**7**	**6**	**7**	**6**	**8**	**8**	**10**	**8**	**14**	**6**	**7**	**14**	**7**	**9**	**8**	**5**
Total Number of Native Species =					**10**	**7**	**7**	**6**	**7**	**6**	**8**	**8**	**10**	**8**	**14**	**6**	**7**	**14**	**7**	**9**	**8**	**5**
Mean Wetland Indicator Value (W) =					**1.6**	**2.6**	**3.4**	**2.7**	**1.6**	**-0.3**	**1.3**	**2.3**	**1.7**	**2.6**	**-1.5**	**2.7**	**1.6**	**-2.1**	**2.3**	**0.4**	**0.3**	**2.2**
Mean Coefficient of Conservatism (C) =					**3.0**	**3.6**	**2.7**	**3.0**	**2.4**	**4.2**	**2.5**	**2.8**	**2.2**	**2.6**	**4.6**	**2.8**	**3.0**	**4.5**	**3.6**	**3.3**	**3.6**	**2.8**

Table 7-2b. Woody Species Upland Vegetative Survey Data - September 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Native	Woody Species Stems Per Permanent 30-Foot Radius Circular Plot																	
					Plot 1	Plot 2	Plot 3	Plot 11	Plot 12	Plot 13	Plot 14	Plot 21	Plot 22	Plot 23	Plot 24	Plot 25	Plot 26	Plot 27	Plot 28	Plot 29	Plot 30	Plot 31
Abies balsamea	Balsam Fir	3	FACW	Yes	9	1			1		2		2	1	4	2	7		1	16	26	24
Acer rubrum	Red Maple	1	FAC	Yes	42				6			8	2	6	23	6	17	80	10	13	9	19
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	Yes														33				
Amelanchier sp.	Serviceberry	NA	NA	Yes	9				1		2		3	3	4			11	15	4		2
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	Yes											1							
Betula papyrifera	Paper Birch	2	FACU+	Yes										1				1	1	1	1	1
Corylus cornuta	Beaked Hazelnut	5	UPL	Yes																	1	
Larix laricina	Tamarack	5	FACW	Yes						5					2			8				
Ledum groenlandicum	Labrador-Tea	8	OBL	Yes											1							
Nemopanthus mucronatus	Mountain Holly	7	OBL	Yes											12			11		4		
Picea glauca	White Spruce	3	FACU	Yes									1									
Picea mariana	Black Spruce	6	FACW	Yes	16	24			23	53	24	23		1	23	10	1	74	1	17		23
Pinus banksiana	Jack Pine	5	FACU	Yes	18	2	16	25	24	32	10	11	11	16		10	10		7			11
Pinus resinosa	Red Pine	6	FACU	Yes															8			
Pinus strobus	White Pine	3	FACU	Yes	2				1			2	2	1	1	3	5		2	4	4	
Populus tremuloides	Quaking Aspen	1	FAC	Yes									43	1			2		47			1
Prunus pensylvanica	Bird Cherry	3	FACU-	Yes										5					2			
Prunus serotina	Black Cherry	2	FACU	Yes									20	14		3			19	1		3
Prunus virginiana	Choke Cherry	2	FAC-	Yes															1	1		
Salix humilis	Prairie Willow	4	FACU	Yes	8						1	2										
Total Number of Species =					**7**	**3**	**1**	**1**	**6**	**3**	**5**	**5**	**8**	**10**	**9**	**6**	**6**	**7**	**12**	**9**	**5**	**8**
Total Number of Native Species =					**7**	**3**	**1**	**1**	**6**	**3**	**5**	**5**	**8**	**10**	**9**	**6**	**6**	**7**	**12**	**9**	**5**	**8**
Mean Wetland Indicator Value (W) =					**0.4**	**-1.0**	**3.0**	**3.0**	**0.0**	**-1.0**	**0.0**	**1.2**	**1.1**	**0.9**	**-2.0**	**0.5**	**0.0**	**-2.0**	**1.1**	**-0.2**	**1.4**	**0.3**
Mean Coefficient of Conservatism (C) =					**3.1**	**4.7**	**5.0**	**5.0**	**3.0**	**5.3**	**3.6**	**3.8**	**2.3**	**2.6**	**4.2**	**3.3**	**3.2**	**3.7**	**2.8**	**2.9**	**2.8**	**2.5**

Table 7-2c. Overall Upland Vegetative Survey Data - September 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Abies balsamea	Balsam Fir	3	FACW	-3	Tree	Yes
Acer rubrum	Red Maple	1	FAC	0	Tree	Yes
Alnus incana ssp. rugosa	Speckled Alder	5	OBL	-5	Shrub	Yes
Amelanchier sp.	Serviceberry	NA	NA		S/T	Yes
Aralia hispida	Hispid Aralia	3	[UPL]	5	Herb	Yes
Aronia prunifolia (A. melanocarpa)	Chokeberry	5	FACW-	-2	Shrub	Yes
Betula papyrifera	Paper Birch	2	FACU+	2	Tree	Yes
Carex lucorum	Lucorum Sedge	4	[UPL]	5	Herb	Yes
Carex sp.	Unidentified Sedge	NA	NA		Herb	Yes
Carex stricta	Strict Sedge	4	OBL	-5	Herb	Yes
Chamaedaphne calyculata	Leatherleaf	8	OBL	-5	Shrub	Yes
Clintonia borealis	Blue Beadlily	5	FAC+	-1	Herb	Yes
Conyza canadensis	Horseweed	0	FAC-	1	Herb	Yes
Coptis trifolia	Goldthread	5	FACW	-3	Herb	Yes
Cornus canadensis	Bunchberry; Dwarf Cornel	6	FAC	0	Herb	Yes
Corylus cornuta	Beaked Hazelnut	5	UPL	5	Shrub	Yes
Cypripedium acaule	Pink Lady-slipper	5	FACW	-3	Herb	Yes
Danthonia spicata	Poverty Grass	4	[UPL]	5	Herb	Yes
Deschampsia flexuosa	Flexuosa Hair-grass	6	[UPL]	5	Herb	Yes
Epigaea repens	Trailing Arbutus	7	[UPL]	5	Herb	Yes
Gaultheria hispidula	Snowberry	8	FACW	-3	Herb	Yes
Gaultheria procumbens	Wintergreen	5	FACU	3	Herb	Yes
Graminoid sp.	Unidentified Grass	NA	NA		Herb	Yes
Iris versicolor	Varicolored Iris	5	OBL	-5	Herb	Yes
Kalmia polifolia	Swamp-laurel	10	OBL	-5	Shrub	Yes
Larix laricina	Tamarack	5	FACW	-3	Tree	Yes
Ledum groenlandicum	Labrador-Tea	8	OBL	-5	Shrub	Yes
Linnaea borealis	Twinflower	6	FAC	0	Herb	Yes
Lycopodium digitatum (Diphasiastrum)	Digitate Clubmoss	3	FACU+	2	Herb	Yes
Maianthemum canadense	Canada Mayflower	4	FAC	0	Herb	Yes
Melampyrum lineare	Cow-wheat	6	FAC-	1	Herb	Yes
NA	Lichen	NA	NA		Lichen	Yes
NA	Moss	NA	NA		Moss	Yes
Nemopanthus mucronatus	Mountain Holly	7	OBL	-5	Shrub	Yes
Panicum depauperatum	Depauperate Panicum-grass	4	[UPL]	5	Herb	Yes
Panicum sp.	Panicum Grass	NA	NA		Herb	Yes
Picea glauca	White Spruce	3	FACU	3	Tree	Yes
Picea mariana	Black Spruce	6	FACW	-3	Tree	Yes
Pinus banksiana	Jack Pine	5	FACU	3	Tree	Yes
Pinus resinosa	Red Pine	6	FACU	3	Tree	Yes
Pinus strobus	White Pine	3	FACU	3	Tree	Yes
Populus tremuloides	Quaking Aspen	1	FAC	0	Tree	Yes
Prunus pensylvanica	Bird Cherry	3	FACU-	4	Tree	Yes
Prunus serotina	Black Cherry	2	FACU	3	Tree	Yes
Prunus virginiana	Choke Cherry	2	FAC-	1	Shrub	Yes
Pteridium aquilinum	Bracken Fern	0	FACU	3	Herb	Yes
Rubus hispidus	Swamp Dewberry	4	FACW	-3	Herb	Yes
Salix humilis	Prairie Willow	4	FACU	3	Shrub	Yes
Smilacina trifolia	Three-leaf False Solomon's-seal	10	OBL	-5	Herb	Yes

Table 7-2c. Overall Upland Vegetative Survey Data - September 2012

Rio Tinto Eagle Mine

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
Sphagnum sp.	Sphagnum Moss	NA	OBL	-5	Moss	Yes
Trientalis borealis	Starflower	5	FAC+	-1	Herb	Yes
Vaccinium angustifolium	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
Vaccinium myrtilloides	Velvetleaf Blueberry	4	FACW-	2	Herb	Yes
NA	Dead Vegetation	NA	NA	NA	NA	NA
NA	Duff / Bare Soil	NA	NA	NA	NA	NA

Total Number of Species =	**53**
Total Number of Native Species =	**53**
Mean Wetland Indicator Value (W) =	**0.1**
Mean Coefficient of Conservatism (C) =	**4.6**
Floristic Quality Index (FQI) =	**33.4**

WETLAND VEGETATIVE SURVEY PHOTOGRAPHS

(all photos taken late June, 2012)

Photo 1. **Plot 1W, north view**

Photo 2. **Plot 1W, south view**

Photo 3. **Plot 1W, quadrat view**

Photo 4. Plot 6W, north view

Photo 5. Plot 6W, south view

Photo 6. Plot 6W, quadrat view

Photo 7. **Plot 7W, north view**

Photo 8. **Plot 7W, south view**

Photo 9. **Plot 7W, quadrat view**

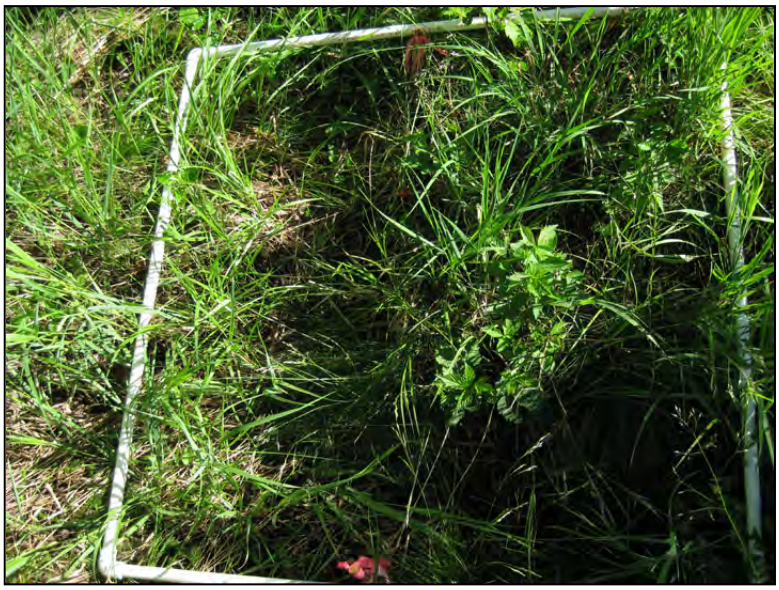


Photo 10. Plot 8W, north view

Photo 11. Plot 8W, south view

Photo 12. Plot 8W, quadrat view

Photo 13. Plot 9W, north view

Photo 14. Plot 9W, south view

Photo 15. Plot 9W, quadrat view

Photo 16. Plot 10W, north view

Photo 17. Plot 10W, south view

Photo 18. Plot 10W, quadrat view

Photo 19. Plot 12W, north view

Photo 20. Plot 12W, south view

Photo 21. Plot 12W, quadrat view

Photo 22. Plot 13W, north view

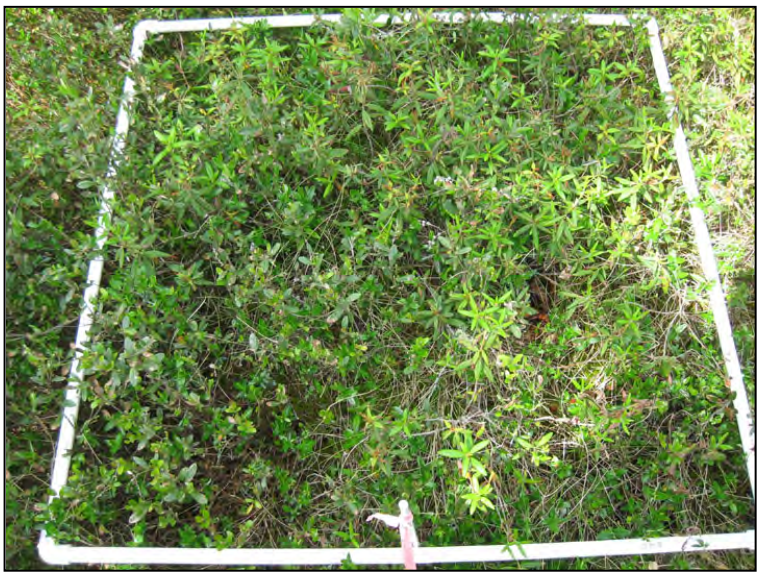
Photo 23. Plot 13W, south view

Photo 24. Plot 13W, quadrat view

Photo 25. Plot 26W, north view

Photo 26. Plot 26W, south view

Photo 27. Plot 26W, quadrat view



UPLAND VEGETATIVE SURVEY PHOTOGRAPHS

(all photos taken during late June, 2012)

Photo 1. Plot 1, north view

Photo 2. Plot 1, south view

Photo 3. Plot 1, quadrat view

Photo 4. Plot 2, north view

Photo 5. Plot 2, south view

Photo 6. Plot 2, quadrat view

Photo 7. Plot 3, north view

Photo 8. Plot 3, south view

Photo 9. Plot 3, quadrat view

Photo 10. Plot 11, north view

Photo 11. Plot 11, south view

Photo 12. Plot 11, quadrat view

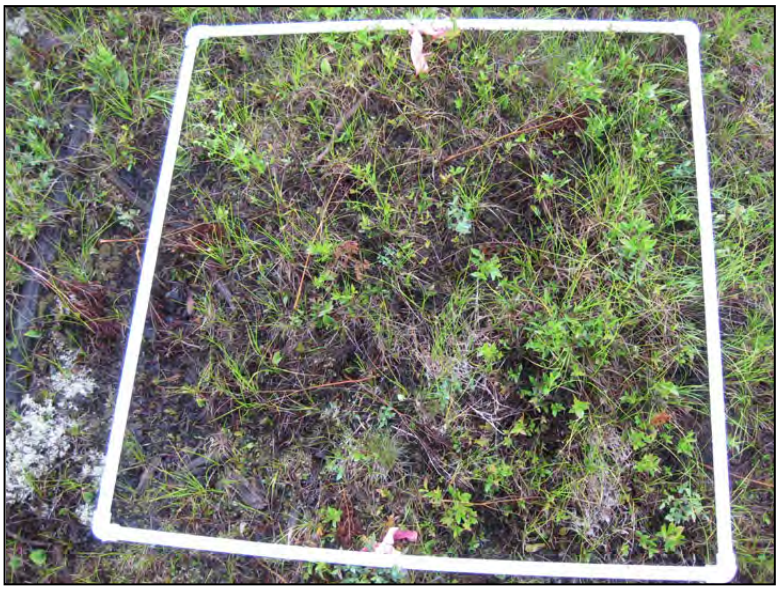


Photo 13. Plot 12, north view

Photo 14. Plot 12, south view

Photo 15. Plot 12, quadrat view

Photo 16. Plot 13, north view

Photo 17. Plot 13, south view

Photo 18. Plot 13, quadrat view

Photo 19. Plot 14, north view

Photo 20. Plot 14, south view

Photo 21. Plot 14, quadrat view

Photo 22. Plot 21, north view

Photo 23. Plot 21, south view

Photo 24. Plot 21, quadrat view

Photo 25. Plot 22, north view

Photo 26. Plot 22, south view

Photo 27. Plot 22, quadrat view

Photo 28. Plot 23, north view

Photo 29. Plot 23, south view

Photo 30. Plot 23, quadrat view

Photo 31. Plot 24, north view

Photo 32. Plot 24, south view

Photo 33. Plot 24, quadrat view

Photo 34. Plot 25, north view

Photo 35. Plot 25, south view

Photo 36. Plot 25, quadrat view

Photo 37. Plot 26, north view

Photo 38. Plot 26, south view

Photo 39. Plot 26, quadrat view

Photo 40. Plot 27, north view

Photo 41. Plot 27, south view

Photo 42. Plot 27, quadrat view

Photo 43. Plot 28, north view

Photo 44. Plot 28, south view

Photo 45. Plot 28, quadrat view

Photo 46. Plot 29, north view

Photo 47. Plot 29, south view

Photo 48. Plot 29, quadrat view

Photo 49. Plot 30, north view

Photo 50. Plot 30, south view

Photo 51. Plot 30, quadrat view

Photo 52. Plot 31, north view

Photo 53. Plot 31, south view

Photo 54. Plot 31, quadrat view