

2013 Wildlife Species & Vegetative Assessment

Eagle Mine LLC

January 2014

Prepared by:

King & MacGregor Environmental, Inc.



2520 Woodmeadow SE
Grand Rapids, Michigan 49546
(616) 957-1231
www.king-macgregor.com

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1.0 INTRODUCTION

King & MacGregor Environmental Inc. (KME) was contracted by Eagle Mine LLC to collect ecological information within the Eagle Project Site (Study Area) located in northern Marquette County, Michigan (Figure 1-1). All figures are provided in Appendix A. KME conducted ecological surveys in 2006-2008 and 2011-2013 for birds, small mammals, large mammals, and frogs and toads. In addition, wetland monitoring and upland vegetative surveys were conducted in 2007, 2008, and 2011-2013. This report is intended to describe the findings of the surveys conducted during 2013 and is considered a supplement to the previously submitted 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 these surveys is to continue 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 *2007 Wildlife Species & Vegetative Assessment* were employed during the 2013 bird surveys. A breeding bird survey was conducted during June 11 through 13, 2013, at 26 survey points; a fall bird survey was conducted during September 17 through 19, 2013, at 18 survey points (Figure 1-3). Survey points 4, 5, 6, 7, 8, 17, 18, and 19 are surveyed during June only. All other points were surveyed twice (i.e., two days) during the breeding and fall surveys. Incidental observations of bird species not associated with survey points were also recorded and reported.

2.2 Results

During the June 2013 breeding bird survey, 539 birds representing 37 species were observed (Tables 2-1a and 2-1b). All tables are provided in Appendix B. During the September 2013 survey, 162 birds representing 22 species were observed (Tables 2-2a and

2-2b). A combined total of 701 birds representing 42 species were identified during these 2013 (June and September) bird surveys (Table 2-3). Nashville warbler was by far the most abundant bird observed during the June 2013 survey, while the blue jay was the most abundant during the September 2013 survey. Additionally, ruffed grouse (*Bonasa umbellus*) and spruce grouse (*Falcipennis canadensis*) were occasionally seen or heard while traveling between survey points and during the vegetative surveys in June and September 2013 near survey points 22, 23, 28, and 29. Two eastern whip-poor-wills (*Antrostomus vociferous*) were heard near survey point 3 on June 16. Several American woodcock (*Scolopax minor*) were also flushed while navigating between points in September. One bald eagle (*Haliaeetus leucocephalus*) was observed in flight high above the southern end of the site, and two American kestrels (*Falco sparverius*) were observed east of point 2 on September 17. The federally endangered and state endangered Kirtland's warbler (*Dendroica kirtlandii*) was not detected at any time during the ecological surveys.

2.3 Discussion

The bird species identified during the 2013 bird surveys are similar to those bird species identified in previous surveys conducted within the Study Area and are consistent with the bird species expected to be found in the habitats present.

3.0 MAMMALS

3.1 Small Mammals

3.1.1 Methods

The methodologies utilized during the 2013 small mammal survey were consistent with those used and described in the *2011 Wildlife Species & Vegetative Assessment*. 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 17-19, 2013. Ten survey points were sampled during the 2013 survey (Figure 1-3). Each survey point was sampled on three consecutive days, for a total of 30 sampling events.

3.1.2 Results

Twenty-seven small mammals representing four species were collected during the September survey period: deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias*

minimus), Southern redback vole (*Clethrionomys gapperi*), and Southern flying squirrel (*Glaucomys volans*) (Table 3). The most common small mammal identified during the survey was the least chipmunk. In addition, snowshoe hares (*Lepus americanus*) and red squirrels (*Sciurus vulgaris*) were incidentally observed throughout the Study Area during the June and September 2013 bird surveys. No threatened, endangered, or special Concern small mammals were observed during any of the surveys.

3.1.3 Discussion

The small mammals encountered within the Study Area during the 2013 surveys are typical of those expected in the habitats present and are generally consistent with previous survey results. Red squirrels appear 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 2013 surveys include muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*), and porcupine (*Erethizon dorsatum*). Small mammals appear to be distributed throughout wooded and open areas, in both upland and wetland habitats.

3.2 Large Mammals

3.2.1 Methods

The methodologies described in the 2007 *Wildlife Species & Vegetative Assessment* were employed during the 2013 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

Whitetail deer (*Odocoileus virginianus*) was the only large mammal species directly observed during the 2013 surveys. Deer were seen infrequently throughout the Study Area during the course of the ecological surveys. Fresh scat and tracks of moose (*Alces alces*) and coyote (*Canis latrans*) were observed occasionally throughout the Study Area.

3.2.3 Discussion

All of the large mammal species detected during the 2013 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 2013 surveys include red fox (*Vulpes vulpes*), gray wolf (*Canis lupus*), bobcat (*Lynx rufus*), and river otter (*Lutra canadensis*). Indirect evidence of gray wolves, which included tracks and scat, was observed during the 2006, 2007, 2011, and 2012 ecological surveys. KME biologists also directly observed a single gray wolf in 2012.

4.0 FROGS AND TOADS

4.1 Methods

The methodologies used and described in the 2007 *Wildlife Species & Vegetative Assessment* were employed during the 2013 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 May 15, June 10, and June 24, 2012. Due to weather conditions, extended ice and snow cover in April, an early spring (April 1 – May 5) survey was not conducted in 2013.

4.2 Results

Five frog species and one toad species were heard during the survey: Northern spring peeper (*Pseudacris crucifer*), gray treefrog (*Hyla versicolor*), green frog (*Rana clamitans*), Western Chorus frog (*Pseudacris triseriata*), mink frog (*Rana septentrionalis*) and the American toad (*Bufo americanus*) (Table 4). Frog and toad calling activity included Call Index values of 1, 2, and 3. No Threatened, Endangered, or Special Concern frog or toad species were identified during the 2013 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. The 2013 survey results are similar to those of previous years.

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. KME requested a Rare Species Review to determine if any protected species had been found in or near the Study Area. MNFI lists the NLG as a threatened species in Michigan. A copy of the MNFI report is provided in Appendix C. In accordance with Michigan Department of Natural Resources (MDNR) guidelines (MDNR 2001), KME surveyed for any MNFI listed species and their habitats during the appropriate season.

As in past years, the MNFI database query indicated the presence of state threatened narrow-leaved gentian (*Gentiana linearis*) along the Salmon Trout River within the Study Area. The methods used to conduct the 2013 narrow-leaved gentian (NLG) field investigation were consistent with the previous NLG studies. However, in 2013, the area of investigation was reduced to the Main Branch Salmon Trout River south of Triple A Road. Local climate changes and overall health of the NLG colonies were assessed relative to previous years, and photographic documentation was collected.

5.2 Results

The 2013 NLG survey results were similar to those of the 2010-2012 surveys (Meier 2010 and KME 2012). Budding NLG were found in abundance (hundreds of individual plants) along the Salmon Trout River in approximately the same areas where they were previously observed in previous years. Photos documenting 2013 observances are provided in Appendix D.

Spruce grouse is a state special concern species; this species was occasionally observed in 2013 during the seasonal vegetative, bird, and small mammal surveys south and east of the Salmon Trout River. Scat and tracks of moose (State Special Concern) were observed occasionally in 2013 throughout the Study Area. A single bald eagle (state special concern) was observed soaring over the southern portion of the study area.

5.3 Discussion

The 2013 NLG survey was conducted on July 16, 2013. Previously, NLG observation and discussion was addressed in a separate report. The NLG colonies appeared healthy in

2013 relative to previous observances. According to National Oceanic and Atmospheric Administration data, precipitation totals were between 50% and 75% of normal for the area during the 2013 water year and temperatures were near average. Flow in the Salmon-Trout River appeared normal. Therefore, the necessary hydrology to support the NLG population appears to have been present in 2013.

6.0 WETLAND VEGETATIVE MONITORING

6.1 Methods

The methodologies used and described in the *2007 Wildlife Species & Vegetative Assessment* were employed during the 2013 wetland vegetative monitoring. KME used the same nine wetland sampling points previously established in 2006 (Figure 1-3).

6.2 Results

The 2013 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.

A total of 69 different plant species were observed during the 2013 wetland vegetation surveys (Table 6c). Overall, the plots contain an average of 84 percent native species (Table 6c). Wetland indicator values in the herbaceous stratum range from UPL to OBL (Table 6a). Plants most often encountered in this stratum were red maple (*Acer rubrum*), and blue joint-grass (*Calamagrostis canadensis*). In the shrub/sapling and overstory stratum (i.e., woody species), the values range from FACU to OBL (Table 6b). The most commonly encountered species were red maple (*Acer rubrum*), speckled alder (*Alnus incana* ssp. *Rugosa*), black spruce (*Picea mariana*), and balsam fir (*Abies balsamea*). The coefficients of conservatism ranged from 0 to 10 for all plots combined, with a mean of 4.3 (Table 6c). No state or federally protected plant species were identified.

6.3 Discussion

The data gathered provides qualitative and quantitative baselines against which to measure future monitoring results and determine if significant changes are occurring. 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 plot 26W, which is within a bog/muskeg. Photos of wetland vegetation plots are provided in Appendix E.

7.0 UPLAND VEGETATIVE MONITORING

7.1 Methods

The methodologies used and described in the *2007 Wildlife Species & Vegetative Assessment* were employed during the 2013 wetland vegetative monitoring. The 2013 early growing season monitoring of upland vegetation was conducted during June 11 and June 12; monitoring occurred at 18 survey points along seven transects. Late summer monitoring was conducted on August 22 at 16 upland survey points. Survey point 3 was not sampled because it was occupied by an exploratory drilling operation during both study periods and point 30 was not sampled because it was occupied during the fall study period. It is also of note that survey point 14 had been significantly altered due to road right-of-way survey clearing, prior to the August 2013 monitoring event.

7.2 Results

The 2013 upland vegetative survey plot data is presented in Tables 7-1a through 7-2c. Tables 7-1a (June) and 7-2a (August) 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 (August) 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 August. 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.

A total of 48 different plant species were observed during the June 2013 upland vegetative surveys (Table 7-1c). A total of 47 different plant species were observed during the August 2013 upland vegetative surveys (Table 7-2c). Each plot exhibited 100 percent native species during both upland survey periods.

In both the June and August 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 August. 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 August upland surveys. The most frequently encountered species in June and August were balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), jack pine (*Pinus banksiana*), and black spruce (*Picea mariana*). 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 4.7 for all June plots and average of 4.7 for all August plots (Table 7-1c and 7-2c). No state or federally protected plant species were documented. Photos of upland vegetation plots are provided in Appendix F.

7.3 Discussion

The data gathered 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 August 2013 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, average coefficient of conservatism average reflects the virtual lack of non-native species. In general, the vegetative assemblage appears to be similar to that which was documented in previous vegetation surveys.

8.0 CONCLUSION

The wildlife and plant species identified during the 2013 surveys within the Study Area are similar to those identified during previous KME surveys with exception of the physical removal of vegetation at survey points 3 and 14. Forty-two species of birds, none of which are threatened or endangered, were observed during the bird surveys, and seven additional bird species were identified during other KME surveys (e.g., vegetation surveys). Four small mammal species, none of which are threatened or endangered, were documented. Only one large mammal species was directly observed in 2013 and no evidence of threatened or endangered large mammal species was recorded. Vegetative sampling plots in both wetland and upland communities identified plant species that are common within the region. No threatened or endangered plant species were encountered within the vegetative survey plots. The population of narrow-leafed gentian observed within the revised study area was robust. 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.

9.0 REFERENCES AND LITERATURE CITED

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APPENDIX A: FIGURES

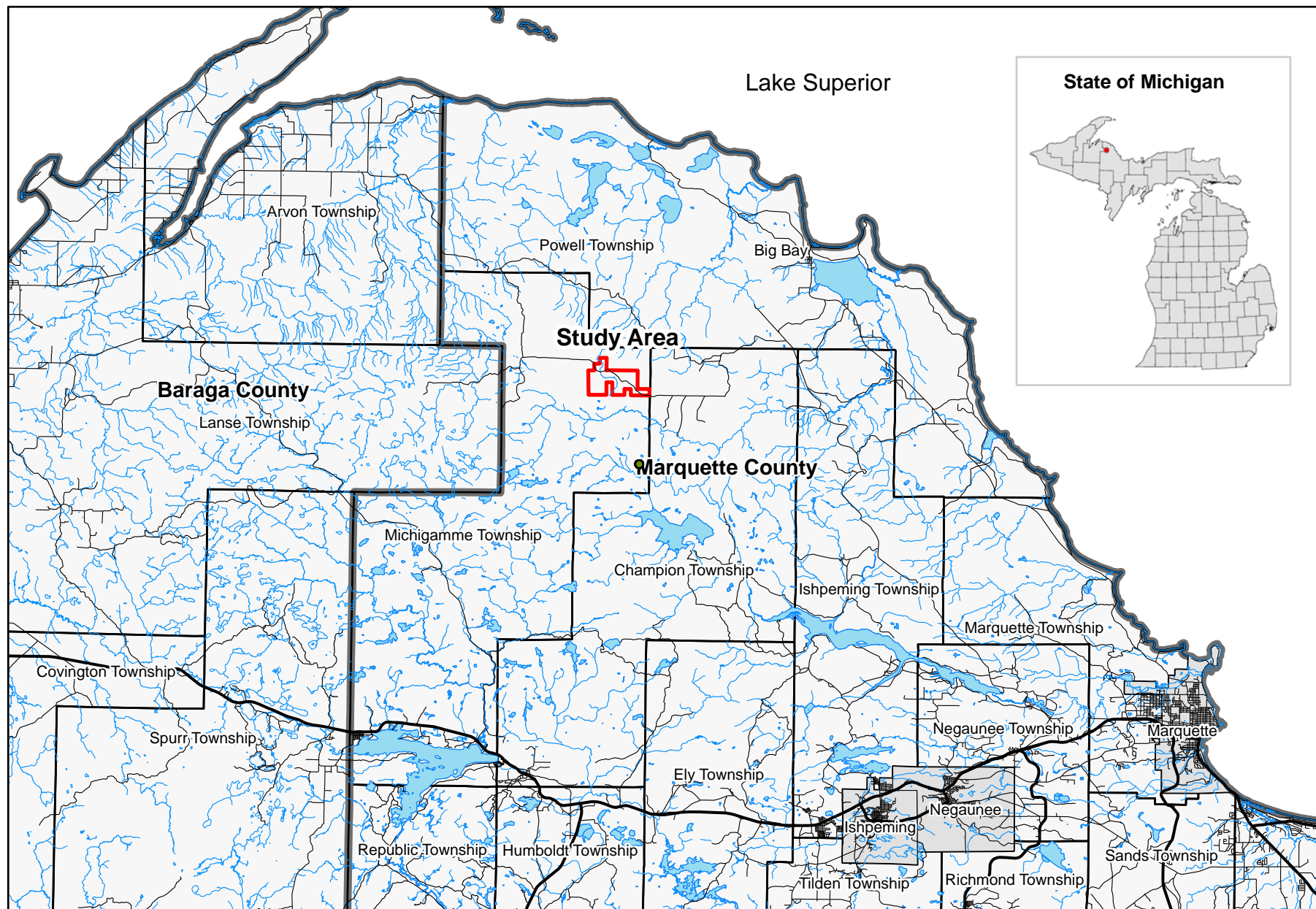








Figure 1-1. Project Location

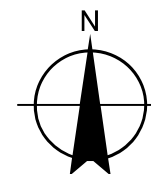


King & MacGregor Environmental, Inc.

Legend

- | | | | |
|---|------------|---|-----------------|
|  | Study Area |  | State Highways |
|  | City |  | Roads |
|  | County |  | Lakes & Streams |

0 2 4 8 Miles



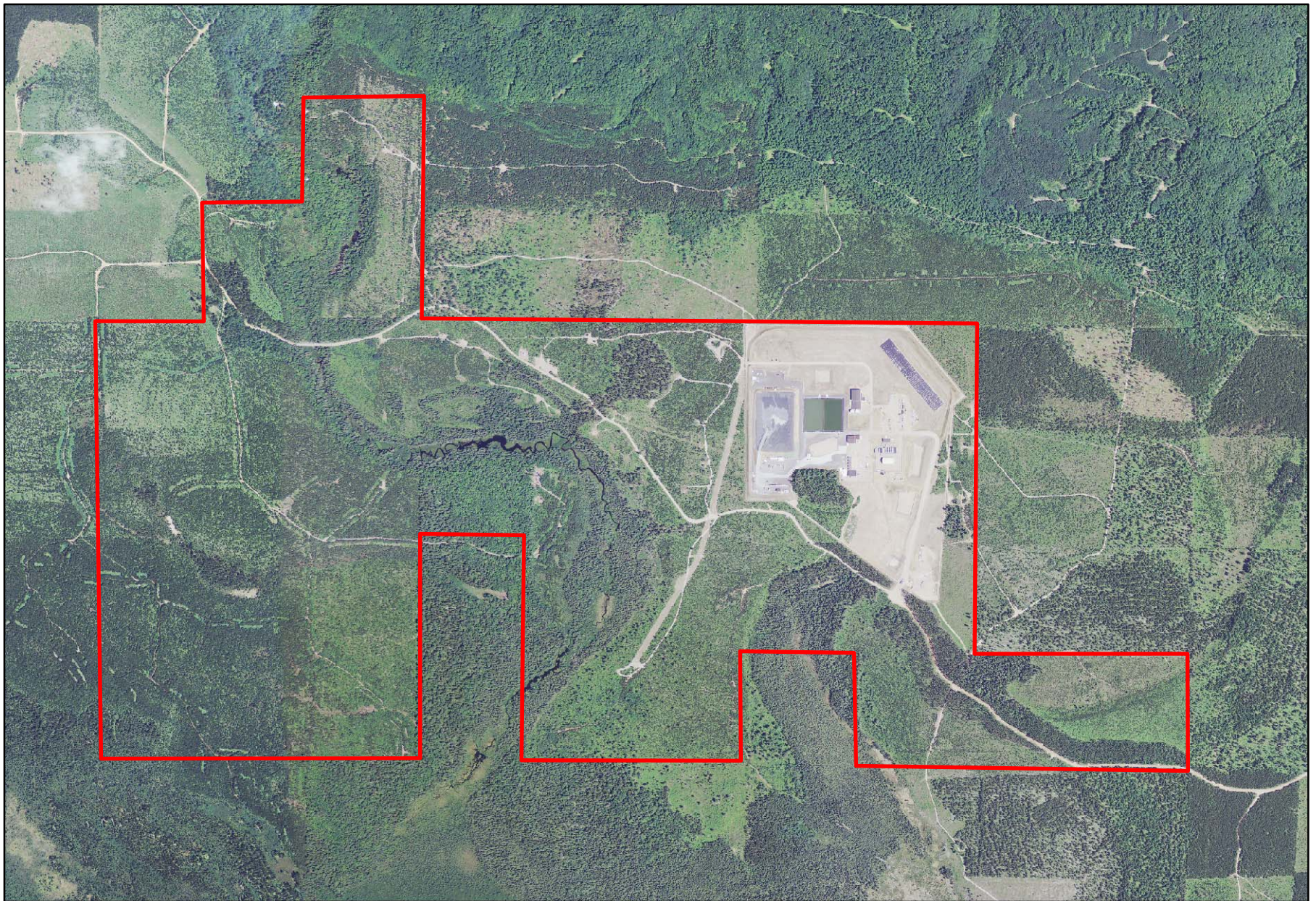
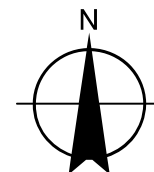
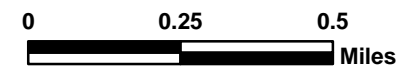
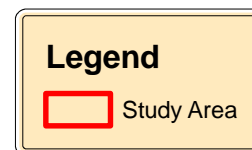


Figure 1-2. Study Area



King & MacGregor Environmental, Inc.



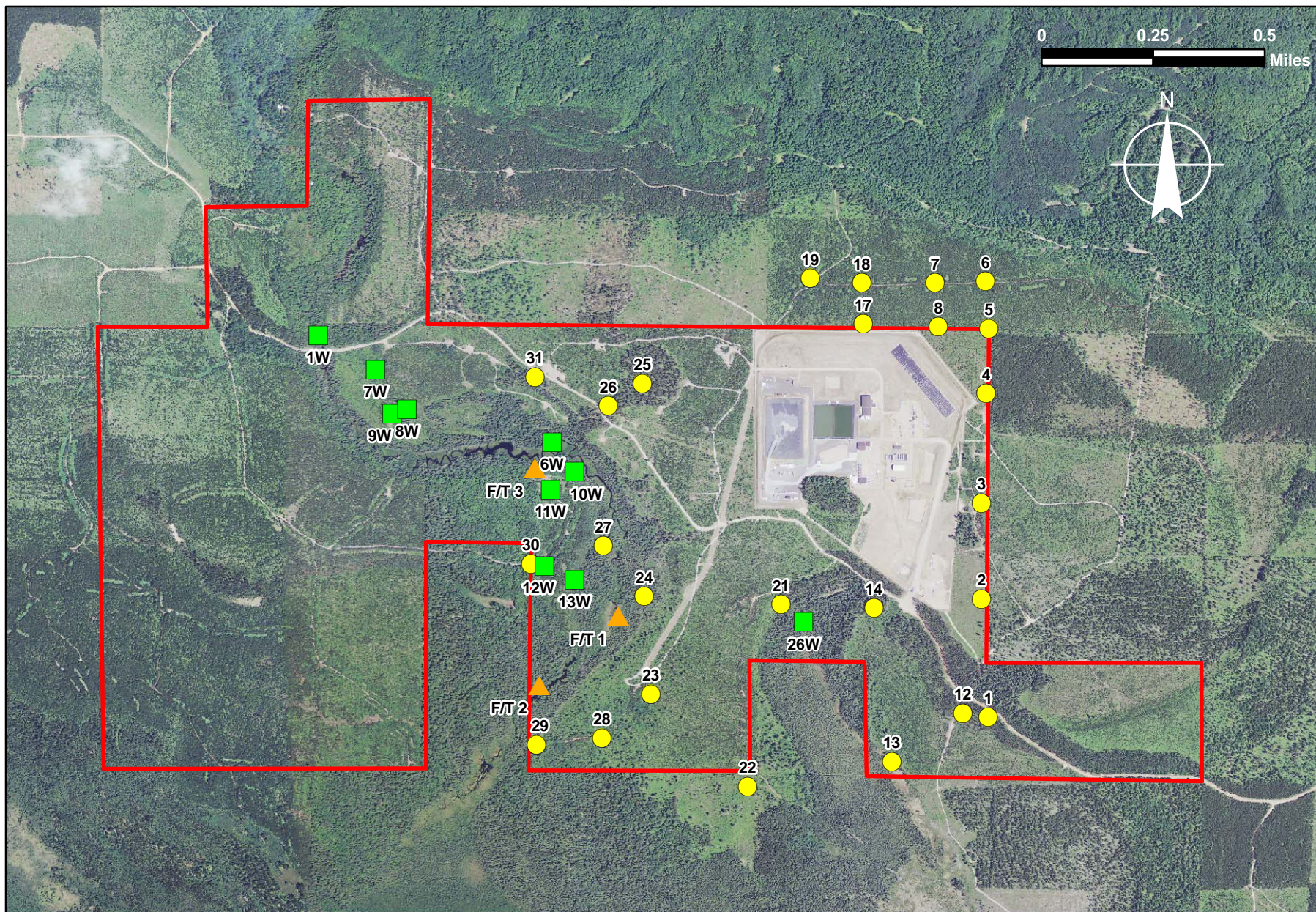


Figure 1-3. Biological and Wetland Sampling Areas



King & MacGregor Environmental, Inc.

Legend

- Bird, Vegetation and/or Small Mammal Sampling Point
- Wetland Vegetation Sampling Point
- ▲ Frog/Toad Sampling Point
- Study Area

APPENDIX B: TABLES

PRIVILEGED AND CONFIDENTIAL

Table 2-1a. Bird Survey Point Data - June 2013

Eagle Mine LLC

Survey Point	Date	Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Brown Thrasher	Canada Goose	Cedar Waxwing	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Golden-crowned Kinglet	Gull sp.	Hermit Thrush	Lincoln's Sparrow	Nashville Warbler	Northern Harrier	Northern Parula	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Red-winged Blackbird	Ruffed Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Willow Flycatcher	Winter Wren	Yellow-rumped Warbler	Total Count	Species Richness	
1	6/12/13		3						1							2	2	3			2		4				1													18	8
1	6/13/13																		2				3				1													6	3
2	6/12/13				1		1	1	1									2	4		2		2									2		2						18	10
2	6/13/13	1																		3			4				2							2						12	5
3	6/12/13				2													3	4		1		3						1						1					15	7
3	6/13/13											9								1		1	2				1													14	5
4	6/12/13				1															2		1	3				1					1								9	6
4	6/13/13														2					1			3	1																7	4
5	6/11/13				1															2		2	3				1													9	5
5	6/12/13				1															3			3		1		1		1			1								11	7
6	6/11/13	2																		2		3	2																	9	4
6	6/12/13				1															3		2	3																	9	4
7	6/11/13			2	1				2											2		1	3																	11	6
7	6/12/13				2						1									2		1	3																	9	5
8	6/11/13	1																				2	2				1					1								7	5
8	6/13/13	1			2															2				2				1					2							10	6
11	6/12/13	2			3		1								1			4	2			1	3					2					1		1					21	11
11	6/13/12						1													2								1							1					5	4
12	6/12/13	2							1								1		1		3		4					1							3					16	8
12	6/13/13																			1			2					1									1			5	4
13	6/12/13	1																2				3	4												4					14	5
13	6/13/13				1															1				2					1						2					7	5
14	6/12/13						1							1						2	1			2				1	1						1					10	8

Table 2-1a.

Bird Survey Point Data - June 2013

Eagle Mine LLC

PRIVILEGED AND CONFIDENTIAL

Table 2-1a. Bird Survey Point Data - June 2013

Eagle Mine LLC

Survey Point	Date	Species																				Total Count	Species Richness																		
		Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Brown Thrasher	Canada Goose	Cedar Waxwing	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Golden-crowned Kinglet	Gull sp.			Hermit Thrush	Lincoln's Sparrow	Nashville Warbler	Northern Harrier	Northern Parula	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Red-winged Blackbird	Ruffed Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Willow Flycatcher	Winter Wren	Yellow-rumped Warbler	
14	6/13/13					1													1					1				2											5	4	
17	6/11/13																		2				1	2				1											6	4	
17	6/12/13														1				2				2																5	3	
18	6/11/13					1									1				2				1	3						2										10	6
18	6/12/13														1		1		1		1	1	3																	8	6
19	6/11/13			1		2											1		3				2	3				1												13	7
19	6/12/13					1									1				1				1	2																6	5
21	6/11/13		1							1												1		3				1		1										8	6
21	6/12/13					1				1									1				2					1								1		1		8	7
22	6/11/13				1										1				3		2		2												1				10	6	
22	6/12/13					1				1					1			1	2				3																	9	6
23	6/11/13						1			1					1		1		3			1		4						1					1	1				15	10
23	6/13/13		2							1								1	1			1		3				1												10	7
24	6/11/13	1										1										1	1				1			1						2		1		9	8
24	6/13/13	1	1			2											1					2	1												2	2		1		13	9
25	6/11/13		2			1				1								1	1			1	2											1			1			11	9
25	6/12/13		2															1	1			1	3					1	1											10	7
26	6/11/13		1			2				3					1				1				2			1	1								1					13	9
26	6/12/13					3				2								1	1				1					1							1					10	7
27	6/11/13	2	1			1																3	2			1			1						1					12	8
27	6/13/13	1	1			1																2	2						1						1		1			10	8
28	6/11/13	1	1							2								1	1			2	3												1					12	8

Table 2-1a. Bird Survey Point Data - June 2013

Eagle Mine LLC

Survey Point	Date	Alder Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	American Woodcock	Belted Kingfisher	Black-capped Chickadee	Blue Jay	Brown Thrasher	Canada Goose	Cedar Waxwing	Chestnut-sided Warbler	Chipping Sparrow	Clay-colored Sparrow	Common Nighthawk	Common Raven	Dark-eyed (slate-colored) Junco	Golden-crowned Kinglet	Gull sp.	Hermit Thrush	Lincoln's Sparrow	Nashville Warbler	Northern Harrier	Northern Parula	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Red-winged Blackbird	Ruffed Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Willow Flycatcher	Winter Wren	Yellow-rumped Warbler	Total Count	Species Richness	
28	6/13/13					1													2			1		2				1												8	6
29	6/11/13																						2				1						1	1						5	4
29	6/13/13	1			7									1	1								1					2		1					3	1		1		19	10
30	6/11/13					1																2		3				1						1						8	5
30	6/13/13					2								1								1		2				1		1	1		1					1		11	9
31	6/11/13		1			1												1	1			1		2			1			2					2					12	9
31	6/12/13					1							2			1		1	1					1				1							2			1		11	9
		7	26	3	8	39	1	4	1	18	1	9	3	3	12	1	7	21	76	1	1	47	6	125	1	1	7	29	2	13	2	2	8	3	38	4	1	8	539	37	

Mean of Species Richness per Survey Point per Day = 6

Median of Species Richness per Survey Point per Day = 6

Table 2-1b. Bird Species Abundance Rankings - June 2013

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Nashville Warbler	<i>Vermivora ruficapilla</i>	125	23.2%
Dark-eyed (slate-colored) Junco	<i>Junco hyemalis</i>	76	14.1%
Hermit Thrush	<i>Catharus guttatus</i>	47	8.7%
American Robin	<i>Turdus migratorius</i>	39	7.2%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	38	7.1%
Pine Warbler	<i>Dendroica pinus</i>	29	5.4%
American Crow	<i>Corvus brachyrhynchos</i>	26	4.8%
Common Raven	<i>Corvus corax</i>	21	3.9%
Blue Jay	<i>Cyanocitta cristata</i>	18	3.3%
Red-eyed Vireo	<i>Vireo olivaceus</i>	13	2.4%
Chipping Sparrow	<i>Spizella passerina</i>	12	2.2%
Canada Goose	<i>Branta canadensis</i>	9	1.7%
American Redstart	<i>Setophaga ruticilla</i>	8	1.5%
Vesper Sparrow	<i>Poocetes gramineus</i>	8	1.5%
Yellow-rumped Warbler	<i>Dendroica coronata</i>	8	1.5%
Alder Flycatcher	<i>Empidonax alnorum</i>	7	1.3%
Common Nighthawk	<i>Chordeiles minor</i>	7	1.3%
Ovenbird	<i>Seiurus aurocapilla</i>	7	1.3%
Lincoln's Sparrow	<i>Melospiza lincolni</i>	6	1.1%
Belted Kingfisher	<i>Megaceryle alcyon</i>	4	0.7%
Willow Flycatcher	<i>Empidonax traillii</i>	4	0.7%
American Goldfinch	<i>Carduelis tristis</i>	3	0.6%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	3	0.6%
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	3	0.6%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	3	0.6%
Red-breasted Nuthatch	<i>Sitta canadensis</i>	2	0.4%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	2	0.4%
Ruffed Grouse	<i>Bonasa umbellus</i>	2	0.4%
American Woodcock	<i>Scolopax minor</i>	1	0.2%
Black-capped Chickadee	<i>Poecile atricapilla</i>	1	0.2%
Brown Thrasher	<i>Toxostoma rufum</i>	1	0.2%
Clay-colored Sparrow	<i>Spizella pallida</i>	1	0.2%
Golden-crowned Kinglet	<i>Regulus satrapa</i>	1	0.2%
Gull sp.		1	0.2%
Northern Harrier	<i>Circus cyaneus</i>	1	0.2%
Northern Parula	<i>Setophaga americana</i>	1	0.2%
Winter Wren	<i>Troglodytes hiemalis</i>	1	0.2%

Total Count = 539

Mean Count per Species = 15

Median Count per Species = 6

Table 2-2a. Bird Survey Point Data - September 2013

Eagle Mine LLC

Survey Point	Date	American Crow	American Goldfinch	American Robin	Black-capped Chickadee	Blue Jay	Canada Goose	Cedar Waxwing	Chipping Sparrow	Common Raven	Dark-eyed (slate-colored) Junco	Downey Woodpecker	Golden-crowned Kinglet	Northern (Yellow-shafted) Flicker	Palm Warbler	Pine Warbler	Red-breasted Nuthatch	Red-winged Blackbird	Sandhill Crane	White-breasted Nuthatch	White-crowned Sparrow	White-throated Sparrow	Yellow-rumped Warbler	Total Count	Species Richness
1	9/17/13					1																		1	1
1	9/18/13					1																		1	1
2	9/17/13			1		1	1																	3	3
2	9/18/13								1		1													2	2
3	9/18/13	2																						2	1
3	9/19/13																							0	0
11	9/17/13	1				1																		2	2
11	9/18/13		1																					1	1
12	9/17/13					2		1			1													4	3
12	9/18/13					3					1				3									7	3
13	9/17/13	1				1					1					1							1	5	5
13	9/18/13					2																		2	1
14	9/17/13																							0	0
14	9/18/13	1												1										2	2
21	9/17/13		2			3										3								8	3
21	9/18/13					2								1										3	2
22	9/17/13			1		1	24							1										27	4
22	9/18/13					2								2										4	2
23	9/17/13	5				1														1				7	3
23	9/18/13	1									1													2	2
24	9/17/13	1				2														1	1			5	4
24	9/18/13					2																		2	1
25	9/17/13			1		4		2																7	3
25	9/19/13					3																		3	1
26	9/17/13		1	1		5																		7	3
26	9/18/13					2																		2	1
27	9/17/13					5																		5	1
27	9/18/13					3							1											4	2
28	9/17/13	2				2				1														5	3
28	9/18/13					3												1						4	2
29	9/17/13					2				1		1		1						1				6	5

Table 2-2a. Bird Survey Point Data - September 2013

Eagle Mine LLC

Survey Point	Date	American Crow	American Goldfinch	American Robin	Black-capped Chickadee	Blue Jay	Canada Goose	Cedar Waxwing	Chipping Sparrow	Common Raven	Dark-eyed (slate-colored) Junco	Downey Woodpecker	Golden-crowned Kinglet	Northern (Yellow-shafted) Flicker	Palm Warbler	Pine Warbler	Red-breasted Nuthatch	Red-winged Blackbird	Sandhill Crane	White-breasted Nuthatch	White-crowned Sparrow	White-throated Sparrow	Yellow-rumped Warbler	Total Count	Species Richness
29	9/18/13	2				3														1				6	3
30	9/17/13		1	1		1				1										2		1		7	6
30	9/19/13			1	1	1											1		2					6	5
31	9/17/13					4													1	1				6	3
31	9/19/13	1				3																		4	2
		17	5	6	1	66	25	3	1	2	6	1	1	6	3	4	1	1	3	7	1	1	1	162	22

Mean of Species Richness per Survey Point per Day = 2
Median of Species Richness per Survey Point per Day = 2

Table 2-2b. Bird Species Abundance Rankings - September 2013

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Blue Jay	<i>Cyanocitta cristata</i>	66	40.7%
Canada Goose	<i>Branta canadensis</i>	25	15.4%
American Crow	<i>Corvus brachyrhynchos</i>	17	10.5%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	7	4.3%
American Robin	<i>Turdus migratorius</i>	6	3.7%
Dark-eyed (slate-colored) Junco	<i>Junco hyemalis</i>	6	3.7%
Northern (Yellow-shafted) Flicker	<i>Colaptes auratus</i>	6	3.7%
American Goldfinch	<i>Carduelis tristis</i>	5	3.1%
Pine Warbler	<i>Setophaga pinus</i>	4	2.5%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	3	1.9%
Palm Warbler	<i>Setophaga palmarum</i>	3	1.9%
Sandhill Crane	<i>Grus canadensis</i>	3	1.9%
Common Raven	<i>Corvus corax</i>	2	1.2%
Black-capped Chickadee	<i>Poecile atricapilla</i>	1	0.6%
Chipping Sparrow	<i>Spizella passerina</i>	1	0.6%
Downy Woodpecker	<i>Picoides pubescens</i>	1	0.6%
Golden-crowned Kinglet	<i>Regulus satrapa</i>	1	0.6%
Red-breasted Nuthatch	<i>Sitta canadensis</i>	1	0.6%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	1	0.6%
White-crownwed Sparrow	<i>Zonotrichia leucophrys</i>	1	0.6%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1	0.6%
Yellow-rumped warbler	<i>Dendroica coronata</i>	1	0.6%

Total Count = 162
Mean Count per Species = 7
Median Count per Species = 3

Table 2-3. Bird Species Abundance Rankings - June and September Combined, 2013

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Nashville Warbler	<i>Vermivora ruficapilla</i>	125	17.8%
Blue Jay	<i>Cyanocitta cristata</i>	84	12.0%
Dark-eyed (slate-colored) Junco	<i>Junco hyemalis</i>	82	11.7%
Hermit Thrush	<i>Catharus guttatus</i>	47	6.7%
American Robin	<i>Turdus migratorius</i>	45	6.4%
American Crow	<i>Corvus brachyrhynchos</i>	43	6.1%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	39	5.6%
Canada Goose	<i>Branta canadensis</i>	34	4.9%
Pine Warbler	<i>Dendroica pinus</i>	33	4.7%
Common Raven	<i>Corvus corax</i>	23	3.3%
Chipping Sparrow	<i>Spizella passerina</i>	13	1.9%
Red-eyed Vireo	<i>Vireo olivaceus</i>	13	1.9%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	10	1.4%
Yellow-rumped Warbler	<i>Dendroica coronata</i>	9	1.3%
American Goldfinch	<i>Carduelis tristis</i>	8	1.1%
American Redstart	<i>Setophaga ruticilla</i>	8	1.1%
Vesper Sparrow	<i>Poecetes gramineus</i>	8	1.1%
Alder Flycatcher	<i>Empidonax alnorum</i>	7	1.0%
Common Nighthawk	<i>Chordeiles minor</i>	7	1.0%
Ovenbird	<i>Seiurus aurocapilla</i>	7	1.0%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	6	0.9%
Lincoln's Sparrow	<i>Melospiza lincolni</i>	6	0.9%
Northern (Yellow-shafted) Flicker	<i>Colaptes auratus</i>	6	0.9%
Belted Kingfisher	<i>Megasceryle alcyon</i>	4	0.6%
Willow Flycatcher	<i>Empidonax traillii</i>	4	0.6%
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	3	0.4%
Palm Warbler	<i>Setophaga palmarum</i>	3	0.4%
Red-breasted Nuthatch	<i>Sitta canadensis</i>	3	0.4%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	3	0.4%
Sandhill Crane	<i>Grus canadensis</i>	3	0.4%
Black-capped Chickadee	<i>Poecile atricapilla</i>	2	0.3%
Golden-crowned Kinglet	<i>Regulus satrapa</i>	2	0.3%
Ruffed Grouse	<i>Bonasa umbellus</i>	2	0.3%
American Woodcock	<i>Scolopax minor</i>	1	0.1%
Brown Thrasher	<i>Toxostoma rufum</i>	1	0.1%
Clay-colored Sparrow	<i>Spizella pallida</i>	1	0.1%
Downy Woodpecker	<i>Picoides pubescens</i>	1	0.1%
Gull sp.		1	0.1%
Northern Harrier	<i>Circus cyaneus</i>	1	0.1%
Northern Parula	<i>Setophaga americana</i>	1	0.1%
White Crowned Sparrow	<i>Zonotrichia albicollis</i>	1	0.1%
Winter Wren	<i>Troglodytes hiemalis</i>	1	0.1%

Total Count = 701

Mean Count per Species = 17

Median Count per Species = 6

Table 3. Small Mammal Survey Point Data - 2013

Eagle Mine LCC

Survey Point	Date	Caught in Sherman Live Trap(s)			Caught with Large Snap Trap			Total Count	Species Richness
		Southern Redback Vole (<i>Clethrionomys gapperi</i>)	Least Chipmunk (<i>Tamias minimus</i>)	Deer Mouse (<i>Peromyscus maniculatus</i>)	Least Chipmunk (<i>Tamias minimus</i>)	Southern Flying Squirrel (<i>Glaucomys volans</i>)			
1	9/17/13						0	0	
1	9/18/13		1				1	1	
1	9/19/13	2	1				3	2	
3	9/17/13				1		1	1	
3	9/18/13		1		1		2	1	
3	9/19/13		2				2	1	
11	9/17/13						0	0	
11	9/18/13						0	0	
11	9/19/13						0	0	
13	9/17/13						0	0	
13	9/18/13		1				1	1	
13	9/19/13		1				1	1	
22	9/17/13						0	0	
22	9/18/13			1			1	1	
22	9/19/13		1				1	1	
23	9/17/13						0	0	
23	9/18/13		2		1		3	1	
23	9/19/13				1		1	1	
25	9/17/13						0	0	
25	9/18/13						0	0	
25	9/19/13		2				2	1	
27	9/17/13						0	0	
27	9/18/13						0	0	
27	9/19/13						0	0	
29	9/17/13						0	0	
29	9/18/13						0	0	
29	9/19/13						0	0	
31	9/17/13			1			1	1	
31	9/18/13		1	2			3	2	
31	9/19/13			3		1	4	2	
		2	13	7	4	1	27		

Mean of Species Richness per Survey Point per Day = 1

Median of Species Richness per Survey Point per Day = 1

Table 4. Frog and Toad Survey Point Data - 2013

Eagle Mine LLC

						Call Index Value (see below for details)*						Species Richness
Survey Point	Survey Period	Date	Time	Temp (°F)	Wind Speed (MPH)	Northern Spring Peeper (<i>Pseudacris crucifer</i>)	Green Frog (<i>Rana clamitans</i>)	Mink Frog (<i>Rana septentrionalis</i>)	Western Chorus frog (<i>Pseudacris triseriata</i>)	American Toad (<i>Bufo americanus</i>)	Gray Treefrog (<i>Hyla versicolor</i>)	
FT01	Late Spring	5/15/13	9:52 PM	65	0.1	3					1	2
FT02	Late Spring	5/15/13	11:00 PM	65	0	2			1		1	3
FT03	Late Spring	5/15/13	11:42 PM	68	0	2						1
FT01	Late Spring	6/10/13	10:05 PM	73	0	2		1		1	1	4
FT02	Late Spring	6/10/13	10:50 PM	73	0	2						1
FT03	Late Spring	6/10/13	11:35 PM	66	0	3		1			1	3
FT01	Summer	6/24/13	10:20 PM	76	0	1	2	1	1			4
FT02	Summer	6/24/13	10:43 PM	77	0	1	2	1	1			4
FT03	Summer	6/24/13	11:08 AM	76	0		2	1		1		3

* 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 = 3

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2013

Eagle Mine LLC

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
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes			5	5		5	10		
<i>Agrostis gigantea</i> (A. alba)	Redtop	0	FACW	No							5		
<i>Agrostis scabra</i>	Tickle-grass	4	FAC	Yes					5				
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	Yes				5					
<i>Anemone quinquefolia</i>	Wood Anemone	5	FAC*	Yes	5								
<i>Betula papyrifera</i>	Paper Birch	2	FACU	Yes							5		
<i>Brachyelytrum erectum</i>	Short-glume Grass	7	[FACU]	Yes	5								
<i>Calamagrostis canadensis</i>	Blue-joint	3	OBL	Yes		5	10	5				25	
<i>Carex lasiocarpa</i>	Woolly-fruit Sedge	8	OBL	Yes		5							
<i>Carex leptalea</i>	Sedge	5	OBL	Yes	20								
<i>Carex oligosperma</i>	Few-seeded Sedge	10	OBL	Yes									5
<i>Carex stricta</i>	Strict Sedge	4	OBL	Yes	50	65						10	
<i>Carex trisperma</i>	Three-seeded Sedge	9	OBL	Yes						5			
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	Yes									20
<i>Cirsium palustre</i>	European Swamp Thistle	0	[FACW+]	No	5								
<i>Cirsium</i> sp.	Thistle	NA	NA	NA				5					
<i>Clintonia borealis</i>	Corn-lily, Bluebead-lily	5	FAC	Yes						5			
<i>Coptis trifolia</i>	Goldthread	5	FACW	Yes				5	5	5			
<i>Cornus canadensis</i>	Bunchberry, Dwarf Cornel	6	FAC	Yes				5	5	5	5		
<i>Danthonia spicata</i>	Poverty Grass	4	[UPL]	Yes					20				
<i>Deschampsia flexuosa</i>	Flexuosa Hair-grass	6	[UPL]	Yes					25				
<i>Diervilla lonicera</i>	Bush-Honeysuckle	4	[UPL]	Yes					5				
<i>Dryopteris intermedia</i>	Intermediate Fern	5	FAC	Yes	5					10			
<i>Epigaea repens</i>	Trailing Arbutus	7	[UPL]	Yes				15					
<i>Hieracium aurantiacum</i>	Orange Hawkweed	0	[UPL]	No					15				
<i>Hieracium caespitosum</i>	Yellow Hawkweed	0	[UPL]	No				15					
<i>Hieracium</i> sp.	Hawkweed	0	[UPL]	No			5						
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	Yes								5	
<i>Kalmia polifolia</i>	Swamp-laurel	10	OBL	Yes									10
<i>Ledum groenlandicum</i>	Labrador-Tea	8	OBL	Yes									25
<i>Linnaea borealis</i>	Twin Flower	6	FAC	Yes				5					
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	Yes			5		5		10		
NA	Moss	NA	NA	Yes			5	10			5		

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2013

Eagle Mine LLC

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
<i>Osmunda cinnamomea</i>	Cinnamon Fern	5	FACW	Yes						5			
<i>Oxalis acetosella</i>	Northern Wood-sorrel	7	FACU	Yes						5			
<i>Panax trifolius</i>	Dwarf Gensing	8	UPL	Yes					5	5			
<i>Phleum pratense</i>	Timothy	0	FACU	No					5				
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes			5						
<i>Potentilla palustris</i>	Marsh Cinquefoil	7	OBL	Yes		5							
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes				5			5		
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	Yes	5								
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	Yes					5		5		
<i>Rubus pubescens</i>	Dwarf Raspberry	4	FACW+	Yes	10								
<i>Rubus setosus</i>	Setose Blackberry	3	FACW-	Yes			5		5				
<i>Rumex acetosella</i>	Red Sorrel, Sheep Sorrel	NA	FACU	No					5				
<i>Rubus sp.</i>	Raspberry	NA	NA	NA							5		
<i>Solidago juncea</i>	Early Goldenrod	3	[UPL]	Yes				5					
<i>Sphagnum sp.</i>	Sphagnum Moss	NA	OBL	Yes						20			90
<i>Thalictrum dasycarpum</i>	Hairy-fruit Meadow-rue	3	FACW-	Yes	5								
<i>Trientalis borealis</i>	Starflower	5	FAC+	Yes							5		
<i>Utricularia sp.</i>	Bladderwort	0	OBL	Yes		5							
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	Yes				45	30		5		
<i>Viola sp.</i>	violet; pansie	NA	NA	NA				5					
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW-	Yes					10		10		
NA	Dead Vegetation	NA	NA	NA		50	75	5				75	
NA	Duff / Bare Soil	NA	NA	NA	10			5	5		75		

Total Number of Species =	9	5	7	14	15	10	12	3	5
Total Number of Native Species =	8	5	6	11	12	10	10	3	5
Mean Wetland Indicator Value (W) =	-1.8	-5.0	-0.3	0.9	1.7	-1.3	0.4	-5.0	-5.0
Mean Coefficient of Conservatism (C) =	3.9	4.4	1.7	2.6	3.5	5.1	2.3	4.0	7.2
Floristic Quality Index (FQI) =	11.7	9.8	4.5	9.9	13.4	16.1	8.1	6.9	16.1

Table 6b. Woody Species Wetland Vegetative Survey Data - June 2013

Eagle Mine LLC

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
<i>Abies balsamea</i>	Balsam Fir	3	FACW	Yes	22		9	58	19	15		2	
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes	59		162	28	69	186	32		
<i>Alnus incana</i> ssp. <i>rugosa</i>	Speckled Alder	5	OBL	Yes	84	59	3						
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	Yes	4		8	5	7	2		1	
<i>Aronia prunifolia</i> (<i>A. melanocarpa</i>)	Chokeberry	5	FACW-	Yes								1	
<i>Betula papyrifera</i>	Paper Birch	2	FACU+	Yes			5	6	9		10		
<i>Crataegus</i> sp.	Hawthorn	NA	NA	NA			1						
<i>Larix laricina</i>	Tamarack	5	FACW	Yes		1				10		4	8
<i>Lonicera canadensis</i>	Canada Honeysuckle	5	FACU	Yes	7								
<i>Nemopanthes mucronatus</i>	Mountain Holly	7	OBL	Yes						5		1	
<i>Picea mariana</i>	Black Spruce	6	FACW	Yes	15			31	13	25	1	12	30
<i>Pinus banksiana</i>	Jack Pine	5	FACU	Yes			4	22	16		2	1	
<i>Pinus resinosa</i>	Red Pine	6	FACU	Yes			2						
<i>Pinus strobus</i>	White Pine	3	FACU	Yes							1		2
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes			10		4				
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU-	Yes					5		1		
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes	10		30	13	11		5		
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	Yes	18								
<i>Salix discolor</i>	Pussy Willow	1	FACW	Yes			1						
<i>Salix humilis</i>	Prairie Willow	4	FACU	Yes	78			1					

Total Number of Species =	9	2	11	8	9	6	7	7	3
Total Number of Native Species =	9	2	10	8	9	6	7	7	3
Mean Wetland Indicator Value (W) =	-0.1	-4.0	0.0	0.6	0.7	-2.3	1.7	-1.9	-1.0
Mean Coefficient of Conservatism (C) =	3.1	5.0	2.4	2.9	2.6	3.7	3.1	4.4	4.7
Floristic Quality Index (FQI) =	9.3	7.1	7.8	8.1	7.7	9.0	8.3	11.7	8.1

Table 6c. Overall Wetland Vegetative Survey Data - June 2013

Eagle Mine LLC

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

Table 6c. Overall Wetland Vegetative Survey Data - June 2013

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
<i>Potentilla palustris</i>	Marsh Cinquefoil	7	OBL	-5	Herb	Yes
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU-	4	Tree	Yes
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	1	Shrub	Yes
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes
<i>Rubus pubescens</i>	Dwarf Raspberry	4	FACW+	-4	Herb	Yes
<i>Rubus setosus</i>	Setose Blackberry	3	FACW-	-2	Shrub	Yes
<i>Rubus sp.</i>	Raspberry	NA	NA	-2	Herb	NA
<i>Rumex acetosella</i>	Red Sorrel	NA	FACU	3	Herb	No
<i>Salix discolor</i>	Pussy Willow	1	FACW	-3	Shrub	Yes
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes
<i>Solidago juncea</i>	Early Goldenrod	3	[UPL]	5	Herb	Yes
<i>Sphagnum sp.</i>	Sphagnum Moss	NA	OBL	-5	Moss	Yes
<i>Thalictrum dasycarpum</i>	Hairy-fruit Meadow-rue	3	FACW-	-2	Herb	Yes
<i>Trientalis borealis</i>	Starflower	5	FAC+	-1	Herb	Yes
<i>Utricularia sp.</i>	Bladderwort	0	OBL	-5	Herb	Yes
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW-	2	Herb	Yes
<i>Viola sp.</i>	Violet	NA	NA		Herb	NA
NA	Dead Vegetation	NA	NA	NA	NA	NA
NA	Duff / Bare Soil	NA	NA	NA	NA	NA

Total Number of Species =	68
Total Number of Native Species =	57
Mean Wetland Indicator Value (W) =	-0.4
Mean Coefficient of Conservatism (C) =	4.3
Floristic Quality Index (FQI) =	35.3

Table 7-1a. Herbaceous Species Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

					Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)																		
Scientific Name	Common Name	C	Wet Code	Native	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	
<i>Abies balsamea</i>	Balsam Fir	3	FACW	Yes																5	5		
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes													10	5		5	10		
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	Yes							5		5		5			10					
<i>Aralia hispida</i>	Bristly Sarsparilla	3	[UPL]	Yes			5																
<i>Aronia prunifolia</i> (<i>A. melanocarpa</i>)	Choke Berry	5	FACW	Yes														5					
<i>Carex lucorum</i>	Blue Ridge Sedge	4	[UPL]	Yes			5	50															
<i>Carex stricta</i>	Tussock Sedge	4	OBL	Yes														70					
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	Yes														5					
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC+	Yes											5			5		5			
<i>Coptis trifolia</i>	Goldthread	5	FACW	Yes											5			5		5	5		
<i>Cornus canadensis</i>	Bunchberry; Dwarf Cornel	6	FAC	Yes											5			5		5	5		
<i>Cypripedium acaule</i>	Pink Lady-slipper	5	FACW	Yes													5						
<i>Danthonia spicata</i>	Poverty Grass	4	[UPL]	Yes			20						5						35				
<i>Deschampsia flexuosa</i>	Hair-grass	6	[UPL]	Yes								5		15		5	5		10			5	
<i>Epigaea repens</i>	Trailing Arbutus	7	[UPL]	Yes	5	15					10	10				5							
<i>Gaultheria hispidula</i>	Creeping Snowberry	8	FACW	Yes														5					
<i>Gaultheria procumbens</i>	Wintergreen	5	FACU	Yes	5				15				5	5	15		10	5		5			
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	Yes														5					
<i>Kalmia polifolia</i>	Bog-laurel	10	OBL	Yes											5								
<i>Ledum groenlandicum</i>	Labrador Tea	8	OBL	Yes											25			5					
<i>Linnaea borealis</i>	Twinflower	6	FAC	Yes	5																		
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	Yes	10	5		5	5	5	20		5									5	
NA	Lichen	NA	NA	Yes	5	90		10				5				10							
NA	Moss	NA	NA	Yes	5				90		80	5		10		80	5		5	60	5	25	
<i>Oryzopsis asperifolia</i>	Rough-leaved Rice-grass	6	UPL	Yes	5																		
<i>Panicum sp.</i>	Panicum Grass	NA	NA	Yes			5																
<i>Pinus strobus</i>	White Pine	3	FACU	Yes									5										
<i>Polygala paucifolia</i>	Fringed Polygala	7	FACU	Yes	5																		
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes									30										
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes										5									
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	Yes	5				5		5	5	5				10		5			5	
<i>Rubus hispidus</i>	Swamp Dewberry	4	FACW	Yes														5					
<i>Sphagnum sp.</i>	Sphagnum Moss	NA	OBL	Yes						95					50			80					

Table 7-1a.

Herbaceous Species Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

Table 7-1a. Herbaceous Species Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

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
<i>Trientalis borealis</i>	Starflower	5	FAC+	Yes							5							5				
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	Yes	20	5	20	40	20	85	10	50	30		30	15	40	5	5		5	25
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW-	Yes		15			30			5		10						20	10	
NA	Dead Vegetation	NA	NA	NA																		
NA	Duff / Bare Soil	NA	NA	NA	25			10			5	65	60	70	10	20	60		50	50	60	80
Total Number of Species =					10	5	5	4	6	3	7	7	8	5	9	5	7	15	6	8	7	5
Total Number of Native Species =					10	5	5	4	6	3	7	7	8	5	9	5	7	15	6	8	7	5
Mean Wetland Indicator Value (W) =					1.4	2.0	3.6	2.0	1.8	-0.7	1.4	2.6	2.1	2.6	-1.4	2.6	1.6	-1.7	2.5	-0.3	-0.1	2.2
Mean Coefficient of Conservatism (C) =					3.9	3.8	3.0	3.0	2.8	2.7	2.9	3.0	2.6	3.4	4.8	3.4	3.0	4.5	3.2	3.6	3.3	2.8
Floristic Quality Index (FQI) =					12.3	8.5	6.7	6.0	6.9	4.6	7.6	7.9	7.4	7.6	14.3	7.6	7.9	17.6	7.8	10.3	8.7	6.3

Table 7-1b. Woody Species Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

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
<i>Abies balsamea</i>	Balsam Fir	3	FACW	Yes	9	1			1		5		2	1	4	2	6			13	26	21
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes	44				4			7	1	6	29	6	18	90	9	12	9	19
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	OBL	Yes														42				
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	Yes	5				1		1		3	2	4			7	10	5		2
<i>Aronia prunifolia (A. melanocarpa)</i>	Chokeberry	5	FACW-	Yes											1							
<i>Betula papyrifera</i>	Paper Birch	2	FACU+	Yes										1				1		1	1	1
<i>Corylus cornuta</i>	Beaked Hazelnut	5	UPL	Yes																	1	
<i>Larix laricina</i>	Tamarack	5	FACW	Yes						5					2			5				
<i>Ledum groenlandicum</i>	Labrador-Tea	8	OBL	Yes											1							
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	Yes											13			6		4		
<i>Picea glauca</i>	White Spruce	3	FACU	Yes									1									
<i>Picea mariana</i>	Black Spruce	6	FACW	Yes	16	24			23	60	24	22		1	21	10		64	1	16		18
<i>Pinus banksiana</i>	Jack Pine	5	FACU	Yes	17	2	16	29	24	33	10	10	18	19		10	8		7			11
<i>Pinus resinosa</i>	Red Pine	6	FACU	Yes															7			
<i>Pinus strobus</i>	White Pine	3	FACU	Yes	2				1			2	3	1	1	4	5		2	3	4	
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes									43	1			1		53			1
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU-	Yes										5					1			
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes									24	18		3			16	2		3
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	Yes															1			
<i>Salix humilis</i>	Prairie Willow	4	FACU	Yes	8	1					1	1										
Total Number of Species =					7	4	1	1	6	3	5	5	8	10	9	6	5	7	10	8	5	8
Total Number of Native Species =					7	4	1	1	6	3	5	5	8	10	9	6	5	7	10	8	5	8
Mean Wetland Indicator Value (W) =					0.4	0.0	3.0	3.0	0.0	-1.0	0.0	1.2	1.1	0.9	-2.0	0.5	0.6	-2.0	1.4	-0.4	1.4	0.3
Mean Coefficient of Conservatism (C) =					3.1	4.5	5.0	5.0	3.0	5.3	3.6	3.8	2.3	2.6	4.2	3.3	2.6	3.7	2.9	3.0	2.8	2.5
Floristic Quality Index (FQI) =					8.3	9.0	5.0	5.0	7.3	9.2	8.0	8.5	6.4	8.2	12.7	8.2	5.8	9.8	9.2	8.5	6.3	7.1

Table 7-1c. Overall Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

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

Table 7-1c. Overall Upland Vegetative Survey Data - June 2013

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
<i>Vaccinium myrtilloides</i>	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 =	48
Total Number of Native Species =	48
Mean Wetland Indicator Value (W) =	0.2
Mean Coefficient of Conservatism (C) =	4.7
Floristic Quality Index (FQI) =	32.4

Table 7-2a. Herbaceous Species Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

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 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 31
<i>Abies balsamea</i>	Balsam Fir	3	FACW	Yes															5	
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes								5				5	10			
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	Yes		5				5		5		5						
<i>Carex lucorum</i>	Lucorum Sedge	4	[UPL]	Yes			25													
<i>Carex stricta</i>	Strict Sedge	4	OBL	Yes													75			
<i>Carex trisperma</i>	Sedge	9	OBL	Yes										5						
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	Yes													5			
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC+	Yes										5					5	
<i>Coptis trifolia</i>	Goldthread	5	FACW	Yes										5			5		5	
<i>Cornus canadensis</i>	Bunchberry; Dwarf Cornel	6	FAC	Yes										5			5		5	
<i>Cypripedium acaule</i>	Pink Lady-slipper	5	FACW	Yes												5				
<i>Danthonia spicata</i>	Poverty Grass	4	[UPL]	Yes								10						15		
<i>Deschampsia flexuosa</i>	Flexuosa Hair-grass	6	[UPL]	Yes		5					5		25		5	10		15		5
<i>Epigaea repens</i>	Trailing Arbutus	7	[UPL]	Yes	15	10				10	5				5					
<i>Gaultheria hispidula</i>	Snowberry	8	FACW	Yes													5			
<i>Gaultheria procumbens</i>	Wintergreen	5	FACU	Yes	15			20				5	5	15		5	5		10	
<i>Graminoid sp.</i>	Unidentified Grass	NA	NA	Yes						5										
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	Yes													5			
<i>Kalmia polifolia</i>	Swamp-laurel	10	OBL	Yes										5						
<i>Ledum groenlandicum</i>	Labrador-Tea	8	OBL	Yes										20			5			
<i>Linnaea borealis</i>	Twinflower	6	FAC	Yes	5															
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	Yes	5	5	5	5	5	5		5								5
NA	Lichen	NA	NA	Yes	5	30	5						5		5					
NA	Moss	NA	NA	Yes	10			85		80			5		90	5		10	70	25
<i>Oryzopsis asperifolia</i>	Rough-leaved Rice-grass	6	OBL	Yes	5															
<i>Pinus strobus</i>	White Pine	3	FACU	Yes								5								
<i>Polygala paucifolia</i>	Fringed Polygala	7	FACU	Yes	5															
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes								10								
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes									5							
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	Yes	65	5	5	15		60	65	50			5	90		90	10	60
<i>Sphagnum sp.</i>	Sphagnum Moss	NA	OBL	Yes					95					40			90			
<i>Trientalis borealis</i>	Starflower	5	FAC+	Yes	5					5								5		
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	Yes	20	25	60	15	85	25	30	55		45	20	25		5		15
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW-	Yes	5	25		30			20		15						25	

Table 7-2a.

Herbaceous Species Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

Table 7-2a. Herbaceous Species Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

					Herbaceous Species Percent Cover Per Quadrat (3.28 ft. x 3.28 ft. plot)															
Scientific Name	Common Name	C	Wet Code	Native	Plot 1	Plot 2	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 31
NA	Dead Vegetation	NA	NA	NA																
NA	Duff / Bare Soil	NA	NA	NA	20		10		5	5	50	50	40	15	20	50		50	30	60
Total Number of Species =					12	8	5	6	3	8	5	9	6	10	6	7	10	6	8	5
Total Number of Native Species =					12	8	5	6	3	8	5	9	6	10	6	7	10	6	8	5
Mean Wetland Indicator Value (W) =					1.3	2.3	2.2	1.8	-0.7	1.3	3.6	1.9	2.2	-1.3	2.7	1.6	-2.8	2.5	0.1	2.2
Mean Coefficient of Conservatism (C) =					4.0	3.1	2.4	2.8	2.7	2.5	4.2	2.4	2.8	5.2	2.8	3.0	5.0	3.2	3.5	2.8
Floristic Quality Index (FQI) =					13.9	8.8	5.4	6.9	4.6	7.1	9.4	7.3	6.9	16.4	6.9	7.9	15.8	7.8	9.9	6.3

Table 7-2b. Woody Species Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

					Woody Species Stems Per Permanent 30-Foot Radius Circular Plot																
Scientific Name	Common Name	C	Wet Code	Native	Plot 1	Plot 2	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 31	
<i>Abies balsamea</i>	Balsam Fir	3	FACW	Yes	10	1		1		2		3	1	5	2	6			16	28	
<i>Acer rubrum</i>	Red Maple	1	FAC	Yes	41			5			8	3	7	27	6	17	95	13	19	21	
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	OBL	Yes													42				
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	Yes	4			3		1		5	3	5			10	12	7	3	
<i>Aronia prunifolia (A. melanocarpa)</i>	Chokeberry	5	FACW-	Yes										1							
<i>Betula papyrifera</i>	Paper Birch	2	FACU+	Yes									1				1	1	1	1	
<i>Larix laricina</i>	Tamarack	5	FACW	Yes					5					1			7				
<i>Ledum groenlandicum</i>	Labrador-Tea	8	OBL	Yes										1							
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	Yes										20			6		4		
<i>Picea glauca</i>	White Spruce	3	FACU	Yes								1									
<i>Picea mariana</i>	Black Spruce	6	FACW	Yes	17	28		23	63	12	30		1	26	8		73	1	20	17	
<i>Pinus banksiana</i>	Jack Pine	5	FACU	Yes	17	2	35	26	30	10	10	18	19		11	7		7		11	
<i>Pinus resinosa</i>	Red Pine	6	FACU	Yes														8			
<i>Pinus strobus</i>	White Pine	3	FACU	Yes	2			1			3	4	1	2	4	6		2	6		
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	Yes								49	1			2		56		1	
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU-	Yes									3					2			
<i>Prunus serotina</i>	Black Cherry	2	FACU	Yes								25	19		3			21	1	2	
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	Yes														2	1		
<i>Salix humilis</i>	Prairie Willow	4	FACU	Yes	10					1	2										

Total Number of Species =	7	3	1	6	3	5	5	8	10	9	6	5	7	11	9	8
Total Number of Native Species =	7	3	1	6	3	5	5	8	10	9	6	5	7	11	9	8
Mean Wetland Indicator Value (W) =	0.4	-1.0	3.0	0.0	-1.0	0.0	1.2	1.1	0.9	-2.0	0.5	0.6	-2.0	1.5	-0.2	0.3
Mean Coefficient of Conservatism (C) =	3.1	4.7	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	2.5
Floristic Quality Index (FQI) =	8.3	8.1	5.0	7.3	9.2	8.0	8.5	6.4	8.2	12.7	8.2	5.8	9.8	9.3	8.7	7.1

Table 7-2c. Overall Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
<i>Abies balsamea</i>	Balsam Fir	3	FACW	-3	Tree	Yes
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes
<i>Alnus incana</i> ssp. <i>rugosa</i>	Speckled Alder	5	OBL	-5	Shrub	Yes
<i>Amelanchier</i> sp.	Serviceberry	NA	NA		S/T	Yes
<i>Aronia prunifolia</i> (<i>A. melanocarpa</i>)	Chokeberry	5	FACW-	-2	Shrub	Yes
<i>Betula papyrifera</i>	Paper Birch	2	FACU+	2	Tree	Yes
<i>Carex lucorum</i>	Lucorum Sedge	4	[UPL]	5	Herb	Yes
<i>Carex stricta</i>	Strict Sedge	4	OBL	-5	Herb	Yes
<i>Carex trisperma</i>	Sedge	9	OBL	-5	Herb	Yes
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC+	-1	Herb	Yes
<i>Conyza canadensis</i>	Horseweed	0	FAC-	1	Herb	Yes
<i>Coptis trifolia</i>	Goldthread	5	FACW	-3	Herb	Yes
<i>Cornus canadensis</i>	Bunchberry; Dwarf Cornel	6	FAC	0	Herb	Yes
<i>Cypripedium acaule</i>	Pink Lady-slipper	5	FACW	-3	Herb	Yes
<i>Danthonia spicata</i>	Poverty Grass	4	[UPL]	5	Herb	Yes
<i>Deschampsia flexuosa</i>	Flexuosa Hair-grass	6	[UPL]	5	Herb	Yes
<i>Epigaea repens</i>	Trailing Arbutus	7	[UPL]	5	Herb	Yes
<i>Gaultheria hispidula</i>	Snowberry	8	FACW	-3	Herb	Yes
<i>Gaultheria procumbens</i>	Wintergreen	5	FACU	3	Herb	Yes
<i>Graminoid</i> sp.	Unidentified Grass	NA	NA		Herb	Yes
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	-5	Herb	Yes
<i>Kalmia polifolia</i>	Swamp-laurel	10	OBL	-5	Shrub	Yes
<i>Larix laricina</i>	Tamarack	5	FACW	-3	Tree	Yes
<i>Ledum groenlandicum</i>	Labrador-Tea	8	OBL	-5	Shrub	Yes
<i>Linnaea borealis</i>	Twinflower	6	FAC	0	Herb	Yes
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes
NA	Lichen	NA	NA		Lichen	Yes
NA	Moss	NA	NA		Moss	Yes
<i>Nemopanthes mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	Yes
<i>Oryzopsis asperifolia</i>	Rough-leaved Ric-grass	6	UPL	5	Herb	Yes
<i>Picea glauca</i>	White Spruce	3	FACU	3	Tree	Yes
<i>Picea mariana</i>	Black Spruce	6	FACW	-3	Tree	Yes
<i>Pinus banksiana</i>	Jack Pine	5	FACU	3	Tree	Yes
<i>Pinus resinosa</i>	Red Pine	6	FACU	3	Tree	Yes
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes
<i>Polygala paucifolia</i>	Fringed polygala	7	FACU	3	Herb	Yes
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU-	4	Tree	Yes
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes
<i>Prunus virginiana</i>	Choke Cherry	2	FAC-	1	Shrub	Yes
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes
<i>Sphagnum</i> sp.	Sphagnum Moss	NA	OBL	-5	Moss	Yes
<i>Trientalis borealis</i>	Starflower	5	FAC+	-1	Herb	Yes
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW-	2	Herb	Yes
NA	Dead Vegetation	NA	NA	NA	NA	NA
NA	Duff / Bare Soil	NA	NA	NA	NA	NA

Table 7-2c. Overall Upland Vegetative Survey Data - August 2013

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
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Total Number of Species =	47
Total Number of Native Species =	47
Mean Wetland Indicator Value (W) =	0.0
Mean Coefficient of Conservatism (C) =	4.7
Floristic Quality Index (FQI) =	32.3

**APPENDIX C:
MICHIGAN NATURAL FEATURES INVENTORY REPORT**

John R. Vigna
King & MacGregor Environmental, Inc.
2520 Woodmeadow Drive SE
Grand Rapids, MI 49546
jvigna@king-macgregor.com

December 4, 2013

**Re: Rare Species Review #1313 – Eagle Mine Ecological Survey, Michigamme Township,
Marquette County, Michigan, T50N, R29W, Section 12.**

John:

The location for the proposed project was checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.



MSU EXTENSION

**Michigan Natural
Features Inventory**

PO Box 13036
Lansing MI 48901

(517) 373-1552
Fax (517) 373-9566

mnfi.anr.msu.edu

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, ...fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.

According to the natural heritage database, legally protected species have been known to occur within 1.5 miles of the proposed project site. Therefore, it is **likely** that listed species will be negatively impacted. Keep in mind that MNFI cannot fully assess potential impacts without an on-site survey. MNFI offers more detailed reviews including field surveys which I would be happy to discuss with you.

Sincerely,

Michael Sanders
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory

Table 1: Legally protected species within 1.5 miles of #1315

SNAME	SCOMNAME	FIRSTOBS	LASTOBS	USESA	SPROT	GRANK	SRANK	ELCAT
<i>Gentiana linearis</i>	Narrow-leaved gentian		1959-07-21		T	G4G5	S2	Plant
<i>Gentiana linearis</i>	Narrow-leaved gentian	1952	1952-07-28		T	G4G5	S2	Plant
<i>Gentiana linearis</i>	Narrow-leaved gentian	2004-08-21	2005-09-09		T	G4G5	S2	Plant

Table 2: Special Concern Species and Rare Natural Communities within 1.5 miles of #1315

SNAME	SCOMNAME	FIRSTOBS	LASTOBS	USESA	SPROT	GRANK	SRANK	ELCAT
<i>Falci pennis canadensis</i>	Spruce grouse	2004-09-05	2004-09-05		SC	G5	S2S3	Animal

Comments for Rare Species Review #1313: Legally protected species have been documented within 1.5 miles of the proposed project. Therefore, it is **likely** that rare natural resources will be impacted by this project. Keep in mind that MNFI cannot fully assess potential impacts without conducting an on-site field survey.

Populations of **narrow-leaved gentian** (*Gentian linearis*) in Michigan are located primarily in areas with soils derived from granite and at least somewhat acidic. This species thrives in wet meadows dominated by sedges and grasses, typically located along river or stream margins and kettle-holes. Narrow-leaved gentian has also been found along sandy lakeshores and bog margins, and can colonize moist disturbed ground such as borrow pits and depressions along road cuts. Elsewhere in its range, this species has a similar close association with granitic soils, occurring in bogs, springy areas, wet meadows, and shores. *G. linearis* flowers from about mid-July to August and possibly as late as early September. Flowers and fruit may occur simultaneously. Management notes: This gentian is a wetland species undoubtedly sensitive to hydrological alterations, and requiring protection from both flooding and excessive drainage. Please see [MNFI's Rare Species Explorer](#) for further information on this and other rare natural features.

Note: If a State listed species occurs at a project site, and you think you need an endangered species permit please contact: Lori Sargent, Nongame Wildlife Biologist, Wildlife Division, Michigan Department of Natural Resources, P.O. Box 30444, Lansing, MI 48909, 517-373-9418, or SargentL@michigan.gov. If a federally listed species is involved and, you think a permit is needed, please contact Barb Hosler, Endangered Species Program, U.S. Fish and Wildlife Service, East Lansing office, 517-351-6326, or Barbara_Hosler@fws.gov.

Codes to accompany Tables 1 & 2

State Protection Status Code Definitions (SPROT)

E: Endangered

T: Threatened

SC: Special concern

Global Heritage Status Rank Definitions (GRANK)

The priority assigned by NatureServe's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Q: Taxonomy uncertain

State Heritage Status Rank Definitions (SRANK)

The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

S1: Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.

S2: Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3: Rare or uncommon in state (on the order of 21 to 100 occurrences).

S4 = apparently secure in state, with many occurrences.

S5 = demonstrably secure in state and essentially ineradicable under present conditions.

SX = apparently extirpated from state.

**APPENDIX D:
NARROW LEAVED GENTIAN PHOTOGRAPHS**



**APPENDIX E:
WETLAND VEGETATIVE SURVEY PHOTOGRAPHS**

(All photos taken during June, 2013)

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

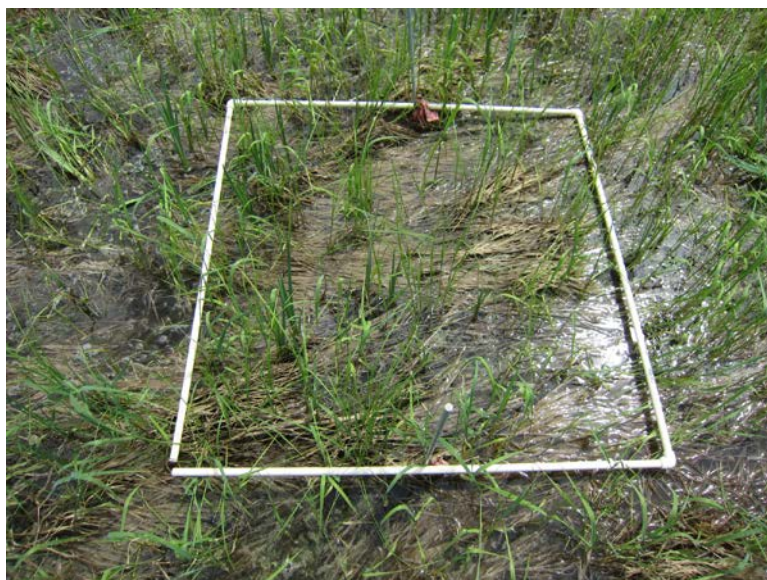


Photo 25. Plot 26W, north view



Photo 26. Plot 26W, south view



Photo 27. Plot 26W, quadrat view



**APPENDIX F:
UPLAND VEGETATIVE SURVEY PHOTOGRAPHS**

(All photos taken during August, 2013)

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

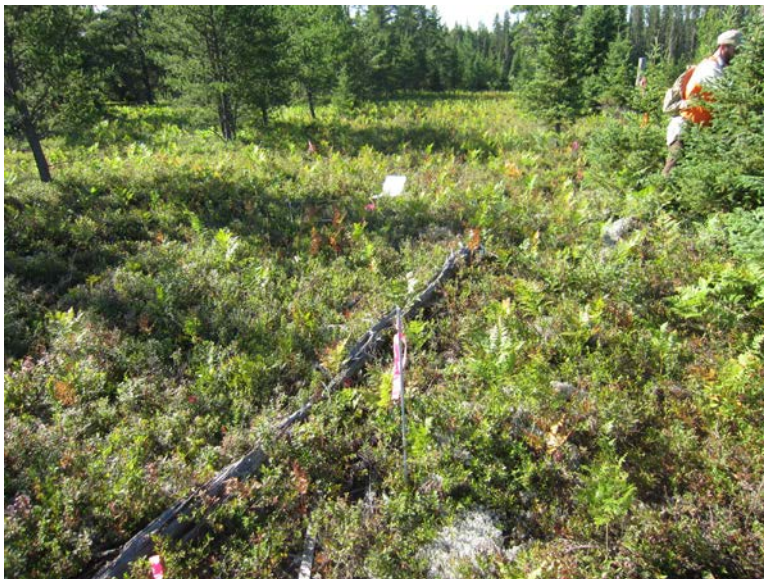


Photo 6. Plot 2, quadrat view

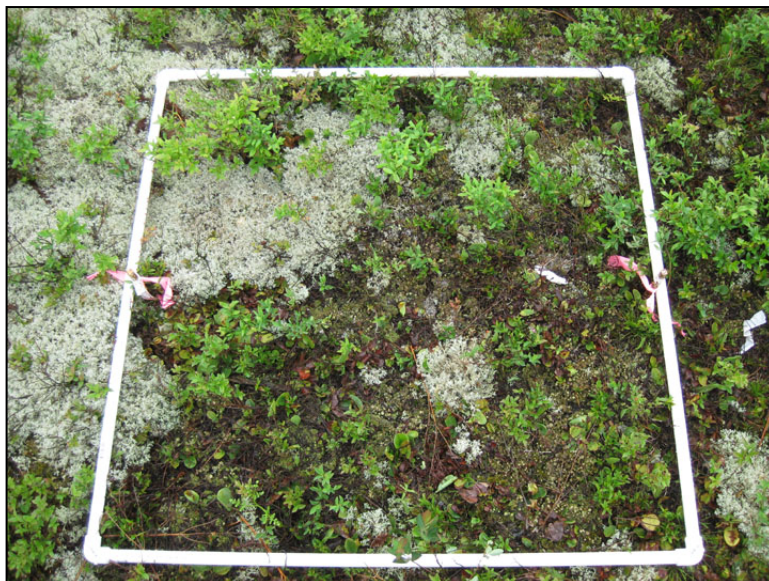


Photo 7. Plot 3



Photo 8. Plot 11, north view



Photo 9. Plot 11, south view



Photo 10. Plot 11, quadrat view

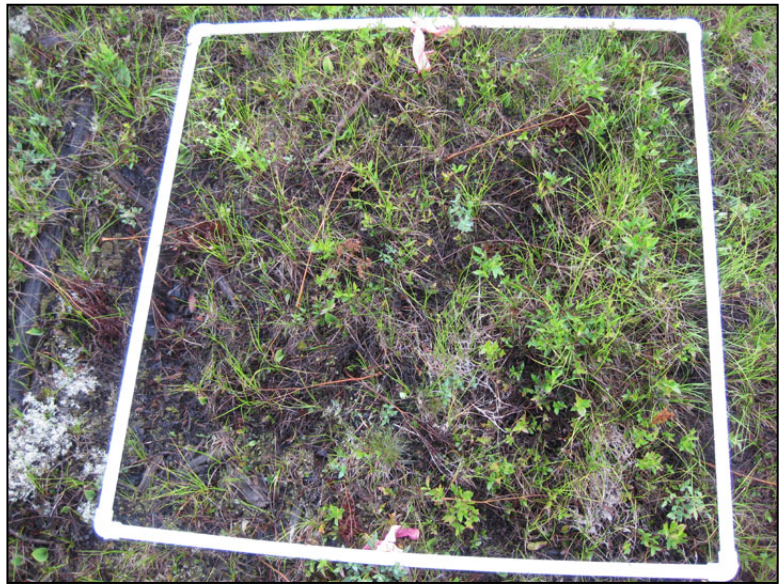


Photo 11. Plot 12, north view



Photo 12. Plot 12, south view



Photo 13. Plot 12, quadrat view



Photo 14. Plot 13, north view



Photo 15. Plot 13, south view



Photo 16. Plot 13, quadrat view



Photo 17. Plot 14, north view



Photo 18. Plot 14, south view



Photo 19. Plot 14, quadrat view



Photo 20. Plot 21, north view



Photo 21. Plot 21, south view



Photo 22. Plot 21, quadrat view



Photo 23. Plot 22, north view



Photo 24. Plot 22, south view



Photo 25. Plot 22, quadrat view



Photo 26. Plot 23, north view



Photo 27. Plot 23, south view



Photo 28. Plot 23, quadrat view



Photo 29. Plot 24, north view



Photo 30. Plot 24, south view



Photo 31. Plot 24, quadrat view



Photo 32. Plot 25, north view



Photo 33. Plot 25, south view



Photo 34. Plot 25, quadrat view



Photo 35. Plot 26, north view



Photo 36. Plot 26, south view



Photo 37. Plot 26, quadrat view



Photo 38. Plot 27, north view



Photo 39. Plot 27, south view



Photo 40. Plot 28, north view



Photo 41. Plot 28, south view

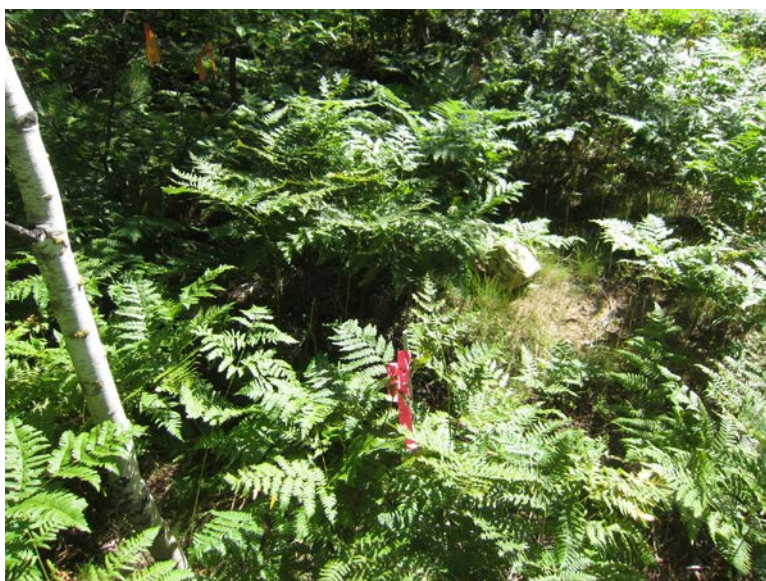


Photo 42. Plot 28, quadrat view



Photo 43. Plot 29, north view



Photo 44. Plot 29, south view



Photo 45. Plot 29, quadrat view



Photo 46. Plot 31, north view



Photo 47. Plot 31, south view



Photo 48. Plot 31, quadrat view

