

2015 Wildlife Species & Vegetative Assessment

Eagle Mine LLC

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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 2011-2015 for birds, small mammals, large mammals, and frogs and toads. In addition, wetland monitoring and upland vegetative surveys were conducted in 2007, 2008, and 2011-2015. This report is intended to describe the findings of the surveys conducted during 2015, and is considered a supplement to the previously submitted surveys.

Point 3, which was inaccessible due to active drilling in 2014, was accessible in 2015 and data was collected. Again, no data was collected at Points 11W and 12W in 2015, as they are still active roadways for logging and drilling traffic.

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 employed in the 2015 bird, small mammal, frog and toad, and vegetation surveys are described in *Wildlife Species Assessment: Kennecott Eagle Minerals Company, Eagle Project Site, Marquette County, Michigan* (KME 2008). A breeding bird survey was conducted June 15 through 19, 2015, at 28 survey points including two meander surveys—one north and one south from Triple A Road. A fall bird survey was conducted September 22 through 24, and September 30, 2015, at 19 survey points (Figure 1-3.). Points were surveyed twice (i.e., two days) during the breeding and fall surveys. Any incidental

observations of bird species not associated with survey points were also recorded and reported.

2.2 Results

During the June 2015 breeding bird survey, 558 birds representing 37 species were observed (Tables 2-1a. and 2-1b.). All tables are provided in Appendix B. During the September 2015 survey, 542 birds representing 25 species were observed (Tables 2-2a. and 2-2b.). A combined total of 1,100 birds representing 42 species were identified during these 2015 (June and September) bird surveys (Table 2-3.). As in previous years, the Nashville warbler was the most abundant bird observed during the June 2015 survey, while the Canada goose was the most abundant species during the September 2015 survey.

2.3 Discussion

The bird species identified and numbers recorded during 2015 are similar to those 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

Sampling methods employed the use of an array of four traps including Sherman box traps, large snap traps, and small snap traps at every survey point. Sampling was conducted September 22 through 24, 2015. Ten survey points were sampled during the 2015 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-three small mammals representing seven species were collected during the September survey period: American pygmy shrew (*Sorex hoyi*), American water shrew (*Sorex palustris*), deer mouse (*Peromyscus maniculatus*), eastern chipmunk (*Tamias striatus*), least chipmunk (*Tamias minimus*), southern redback vole (*Clethrionomys gapperi*), and northern short-tailed shrew (*Blarina brevicauda*; Table 3.). The most common small

mammal identified during the survey was the deer mouse. Snowshoe hares (*Lepus americanus*) and red squirrels (*Sciurus vulgaris*) were incidentally observed throughout the Study Area during the 2015 surveys.

3.1.3 Discussion

The small mammals encountered within the Study Area during the 2015 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 2015 surveys include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), fisher (*Martes pennant*), raccoon (*Procyon lotor*), and river otter (*Lutra canadensis*). 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

Although the KME 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 2015 surveys. Deer were seen infrequently throughout the Study Area during the course of the ecological surveys. As in previous years, 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 2015 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 observed during the 2015 surveys include American black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), the federally endangered gray wolf (*Canis lupus*), and bobcat (*Lynx rufus*). 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

KME used the same three frog and toad sampling points previously established in 2006 (Figure 1-3.). Surveys were conducted after sunset on April 16, June 2, and June 29, 2015.

4.2 Results

Three frog species were heard during the survey: American toad (*Bufo americanus*), green frog (*Rana clamitans*), and northern spring peeper (*Pseudacris crucifer*; Table 4). Calling activity included Call Index values of 1, 2, and 3. No calls were recorded during the April 16 survey.

4.3 Discussion

All three of the sampling points exhibited use by frogs for breeding. The most frequently recorded species were the northern spring peeper and green frog. The frog species identified are typical of those expected in the habitats present in the Study Area. The 2015 survey results are similar to those of previous years. The absence of calls during the April 16 survey is most likely due to weather conditions including low temperatures and persistent ice and snow cover.

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 (Appendix C) to determine if any protected species are known to occur within or nearby the Study Area (MNFI 2013). MNFI lists the narrow-leaved gentian (NLG; *Gentiana linearis*) as a state threatened species, and the spruce grouse (*Falci pennis canadensis*) as a state special concern species. In accordance with Michigan Department of Natural Resources (MDNR) guidelines (MDNR 2001), KME surveyed for MNFI listed species and/or their habitats during the appropriate season.

As in past years, the MNFI Rare Species Review indicated the presence of NLG along the Salmon Trout River within the Study Area. The methods used to conduct the 2015 NLG field investigation were consistent with the previous NLG studies. Photographic and Global Positioning System documentation were collected on August 19, 2015 (Appendix D and Figure 5-1.). The area of investigation for NLG was expanded in 2014 to include the area just north of the Yellow Dog River west to the Salmon Trout River in addition to the main branch of the Salmon Trout River south of Triple A Road. Local climate changes and overall health of the NLG colonies were assessed relative to previous years.

5.2 Results

The 2015 NLG survey results were similar to those of the 2010-2014 surveys (Meier 2010 and KME 2015). Flowering NLG were found in abundance (hundreds of individual plants) both along the Salmon Trout River in approximately the same areas where they were observed in previous years, and in the expanded search area north of the Yellow Dog River.

In 2006, the state and federally endangered Kirtland's warbler (*Dendroica kirtlandii*) was observed in Marquette County. Kirtland's warbler was not detected at any time during any of the 2015 ecological surveys. Spruce grouse is a state species of special concern; this species was occasionally observed in 2015 during the seasonal ecological surveys south and east of the Salmon Trout River. Scat and tracks of moose, also listed as state species of special concern, were observed occasionally in 2015 throughout the Study Area. No evidence of gray wolf activity was discovered.

5.3 Discussion

The NLG colonies appeared healthy in 2015 relative to previous observances. According to National Oceanic and Atmospheric Administration data, precipitation totals were within 10 percent of normal for the area during the 2015 water year and temperatures were near average. Flow in the Salmon Trout River and Yellow Dog River appeared normal. The necessary hydrology to support the NLG population appears to have been present in 2015. Although not observed in 2015, evidence of gray wolf activity and direct observation have been recorded as recently as 2012. Kirtland's warbler has not been detected in the Study Area since KME began monitoring; however, suitable habitat for the species exists on site. Moose and spruce grouse appear to be active residents of the Study Area.

6.0 WETLAND VEGETATIVE MONITORING

6.1 Methods

Eight of the original ten wetland sampling points established in 2006 were surveyed (Figure 1-3.). As noted in the introduction, Points 11W and 12W were not surveyed due to permanent disturbance. Wetland indicator statuses, native species ratings, and coefficients of conservatism are consistent with the *National Wetland Plant List* (U.S. Army Corps of Engineers, 2014) and the University of Michigan Herbarium's online database (Reznicek et al., 2011). Wetland points were surveyed on June 9 and 10, 2015.

6.2 Results

The 2015 wetland sampling point data are presented in Tables 6a. through 6c. Table 6a. summarizes the herbaceous data collected within each wetland quadrat; percent duff/bare soil, dead vegetation, and moss cover are 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; this table summarizes the combined data and lists the total number of species, total number of native species, mean wetland indicator number, floristic quality index (FQI), and mean coefficient of conservatism.

A total of 58 different vascular plant species were observed during the 2015 wetland vegetation surveys, of which at least 55 were native (Table 6c.). The three species positively identified as non-native exhibited a low percent cover. Overall, the plots contain an average of 95 percent native species. Wetland indicator values in the herbaceous stratum range from UPL to OBL (Table 6a.). Plants most often encountered in this stratum were blue-joint (*Calamagrostis canadensis*), bunchberry (*Cornus canadensis*), low sweet blueberry (*Vaccinium angustifolium*), and tussock sedge (*Carex stricta*). 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*), black spruce (*Picea mariana*), speckled alder (*Alnus incana* ssp. *rugosa*), and balsam fir (*Abies balsamea*). The coefficients of conservatism ranged from 0 to 10 for all plots combined, with a mean of 4.4 (Table 6c.). The FQI for all wetland plots was 33.8 (Table 6c.). Mean wetland indicator value was -0.3 (Table 6c.).

6.3 Discussion

The data gathered provide 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 FACW 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 2015 early growing season monitoring of upland vegetation was conducted during June 9 and 10. Monitoring occurred at 18 survey points along seven transects. Late summer monitoring was conducted on August 18 and 19, at 18 upland survey points (Fig. 1-3.).

7.2 Results

The 2015 upland vegetative survey point data are 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 43 different vascular plant species were observed during the June 2015 upland vegetative surveys (Table 7-1c.). A total of 43 different vascular plant species were also observed during the August 2015 upland vegetative surveys (Table 7-2c.). All but plot 14 exhibited 100 percent native species during both upland survey periods. Plot 14, as previously mentioned, was cleared and seeded during a road improvement project.

In the June upland survey, the most commonly observed plants within the herbaceous quadrats were bracken fern (*Pteridium aquilinum*), low sweet blueberry, and an unidentified moss species. In the August upland survey, the most commonly observed plants within the quadrats were velvetleaf blueberry (*Vaccinium myrtilloides*), low sweet blueberry, and an unidentified moss species. Bare soil/duff was also frequently noted in both June and August. Because the foliage of different species can overlap, the total cover in some plots exceeds 100 percent.

Within the 30-foot radius circular plots, 17 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 red maple (*Acer rubrum*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and jack pine (*Pinus banksiana*).

The coefficients of conservatism ranged from 0 to 10, with an average of 4.7 for June plots and 4.4 for 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. The overall FQI for upland plots was 30.7 in June and 28.9 in August.

7.3 Discussion

The data gathered provide 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 2015 herbaceous plant lists is likely due to seasonal plant emergence and senescence. The wide range of wetland indicator codes indicates a wide variability of microtopographical conditions. The moderate overall mean coefficient of conservatism reflects the lack of non-native species encountered. In general, the vegetative assemblage appears to be similar to previous vegetation surveys.

8.0 CONCLUSION

The wildlife and plant species identified during the 2015 surveys within the Study Area are similar to those identified during previous KME surveys. Forty-two species of birds, none of which are threatened or endangered, were observed during the bird surveys. Seven small mammal species, none of which are threatened or endangered, were documented. Only one large mammal species, white tailed deer, was directly observed in 2015, 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-leaved gentian (a state threatened species) 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

- King & MacGregor Environmental, Inc. (KME). 2007. Wildlife Species Assessment: Kennecott Eagle Minerals Company, Eagle Project Site, Marquette County, Michigan.
- King & MacGregor Environmental, Inc. (KME). 2015. 2014 Wildlife Species & Vegetative Assessment: Eagle Mine LLC.
- Meier, John G. 2010. Narrow-leaved Gentian Survey - Eagle Mine and Regional Area 2010 Update.
- Michigan Department of Natural Resources (MDNR). 2001. Guidelines for Conducting Endangered and Threatened Species Surveys.
http://www.michigandnr.com/publications/pdfs/huntingwildlifehabitat/TE_surveyguide.pdf.
- Michigan Natural Features Inventory. 2013. Rare Species Review #1313 - Michigan's Natural Heritage Database, December 4, 2013.
- Reznicek, Anton A., E. G. Voss, & B. S. Walters. 2011. Michigan Flora Online. University of Michigan. Web.12-8-2014. <http://michiganflora.net/acknowledgments.aspx>
- U.S. Army Corps of Engineers. 2014. *National Wetland Plant List, version 3.2*:
http://wetland_plants.usace.army.mil/, U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH.

APPENDIX A: FIGURES

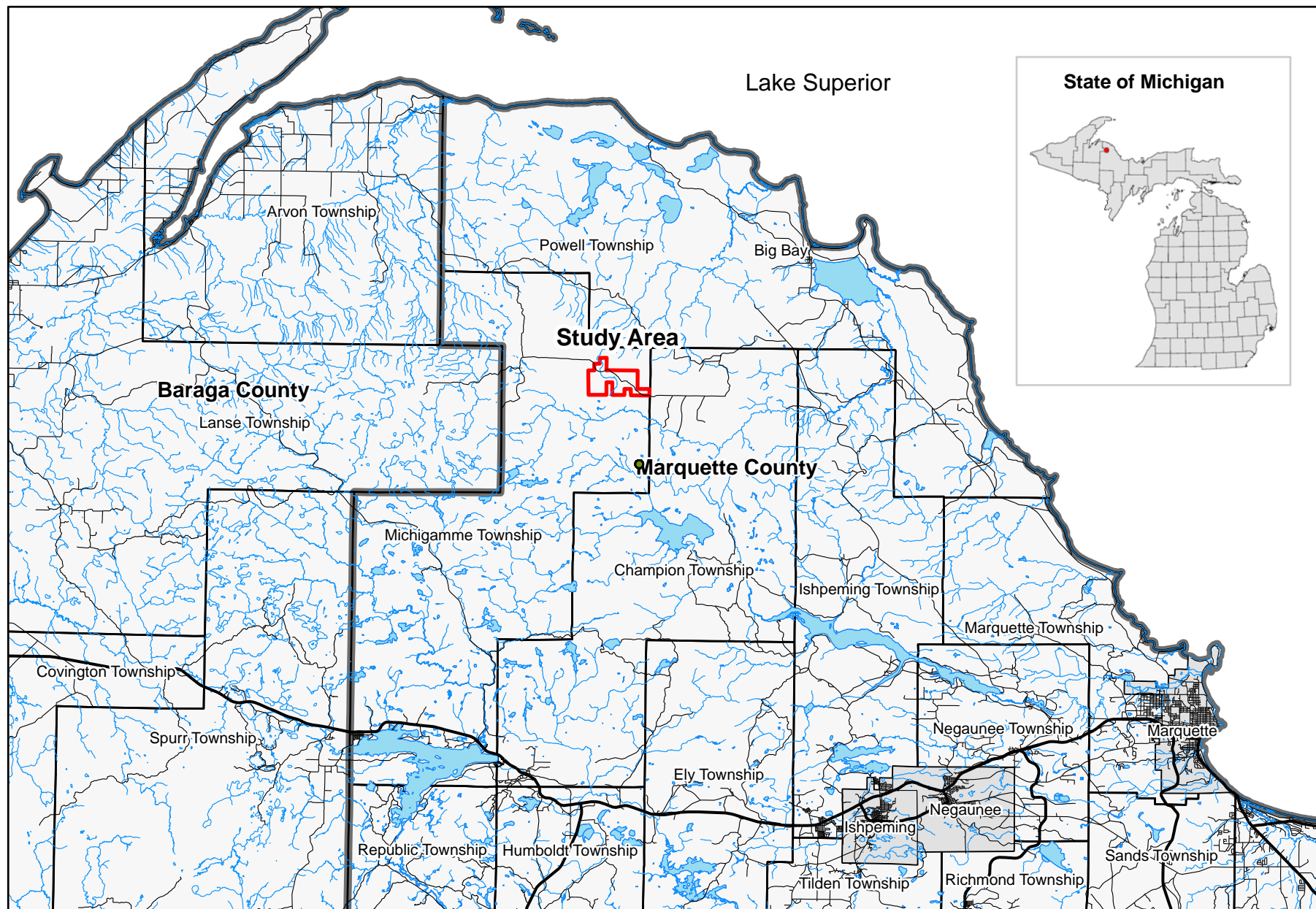


Figure 1-1. Project Location

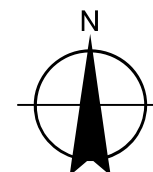


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Legend

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

0 2 4 8 Miles



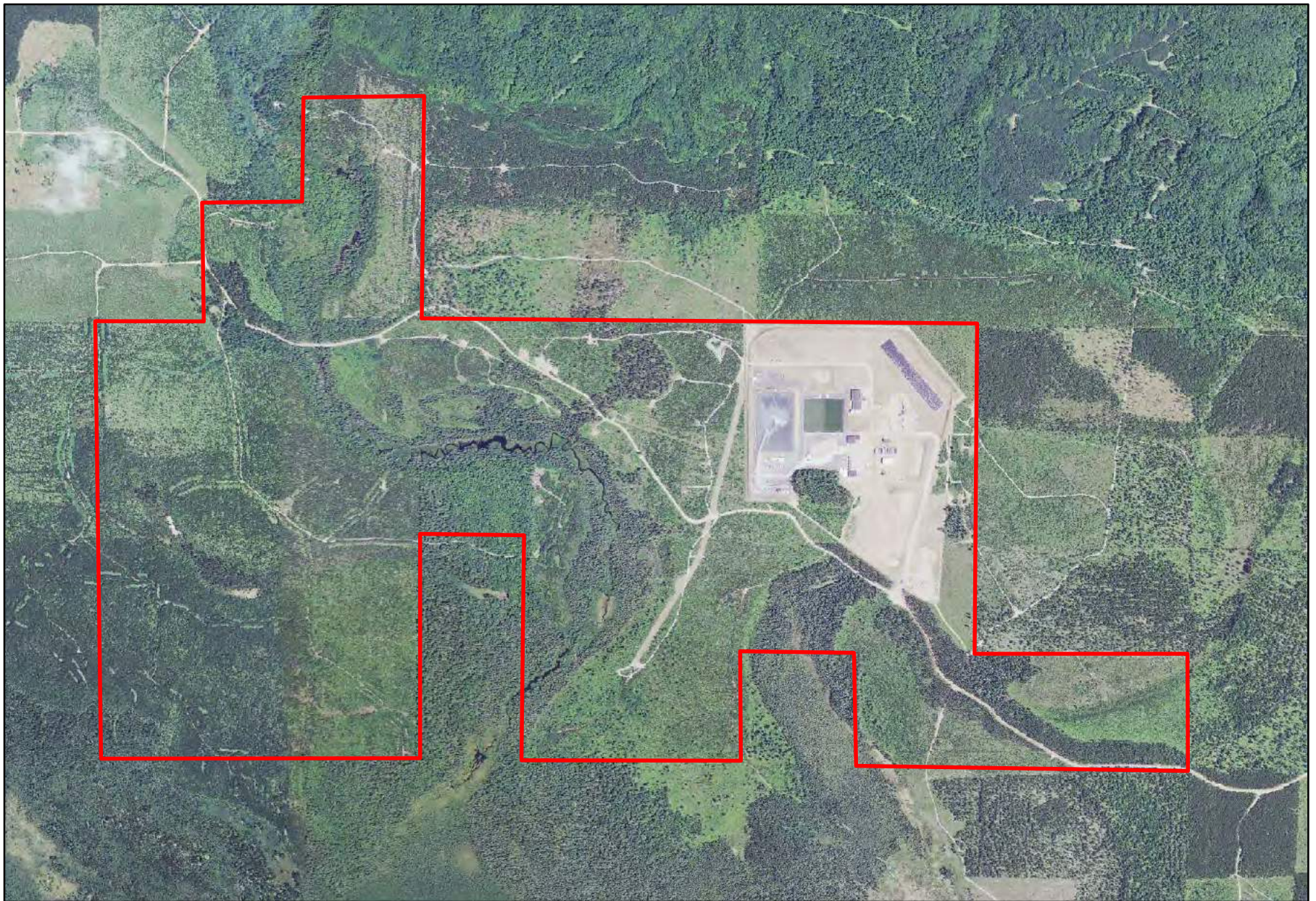
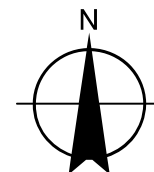
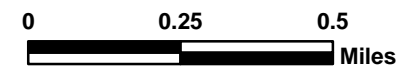
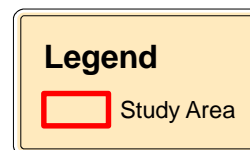


Figure 1-2. Study Area



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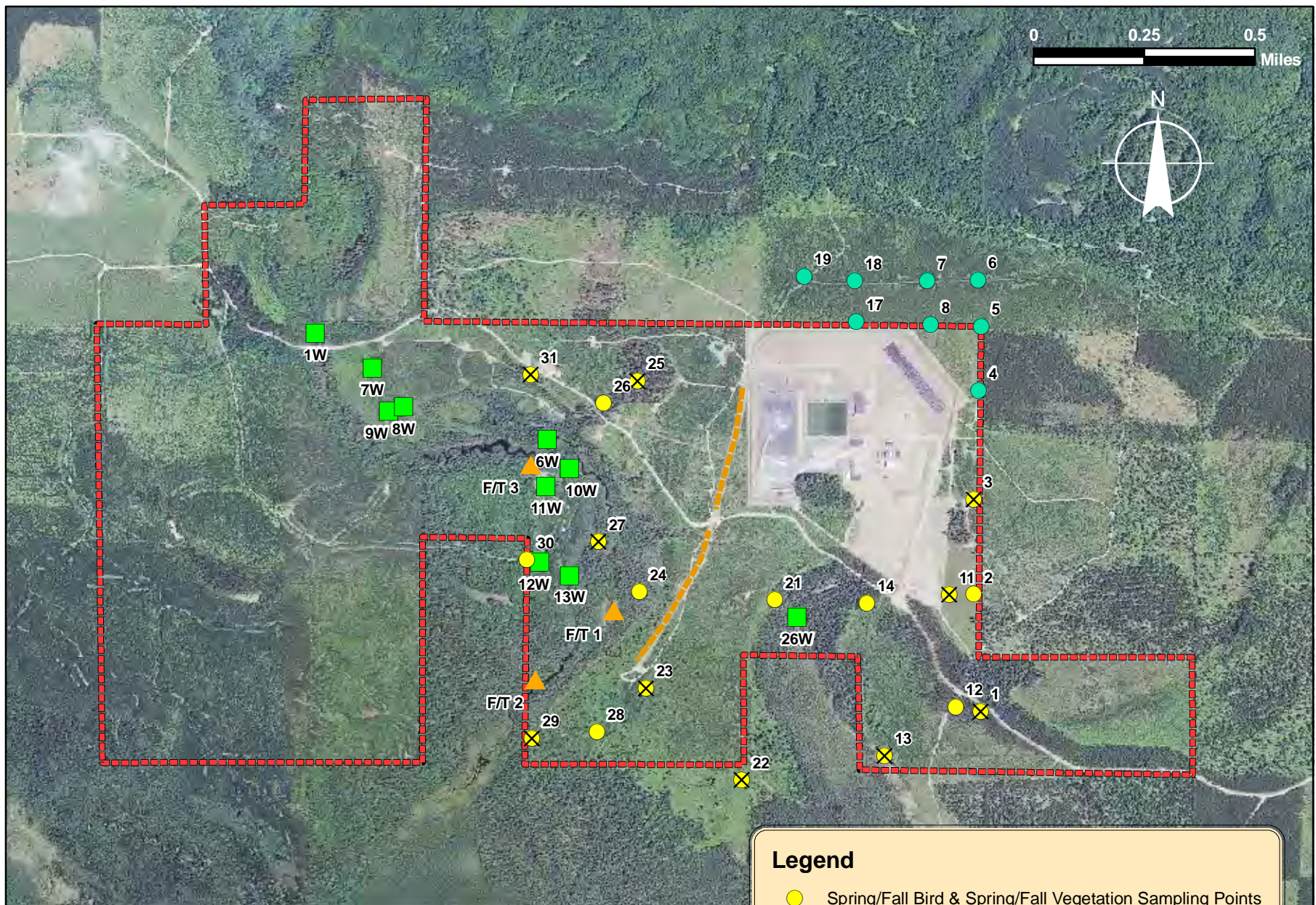


Figure 1-3. Biological and Wetland Sampling Areas



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Legend

- Spring/Fall Bird & Spring/Fall Vegetation Sampling Points
- Spring-Only Bird Sampling Points
- Meander Survey
- X Small Mammal Trapping Points (Fall Only)
- Wetland Vegetation Sampling Point
- ▲ Frog/Toad Sampling Point
- Study Area

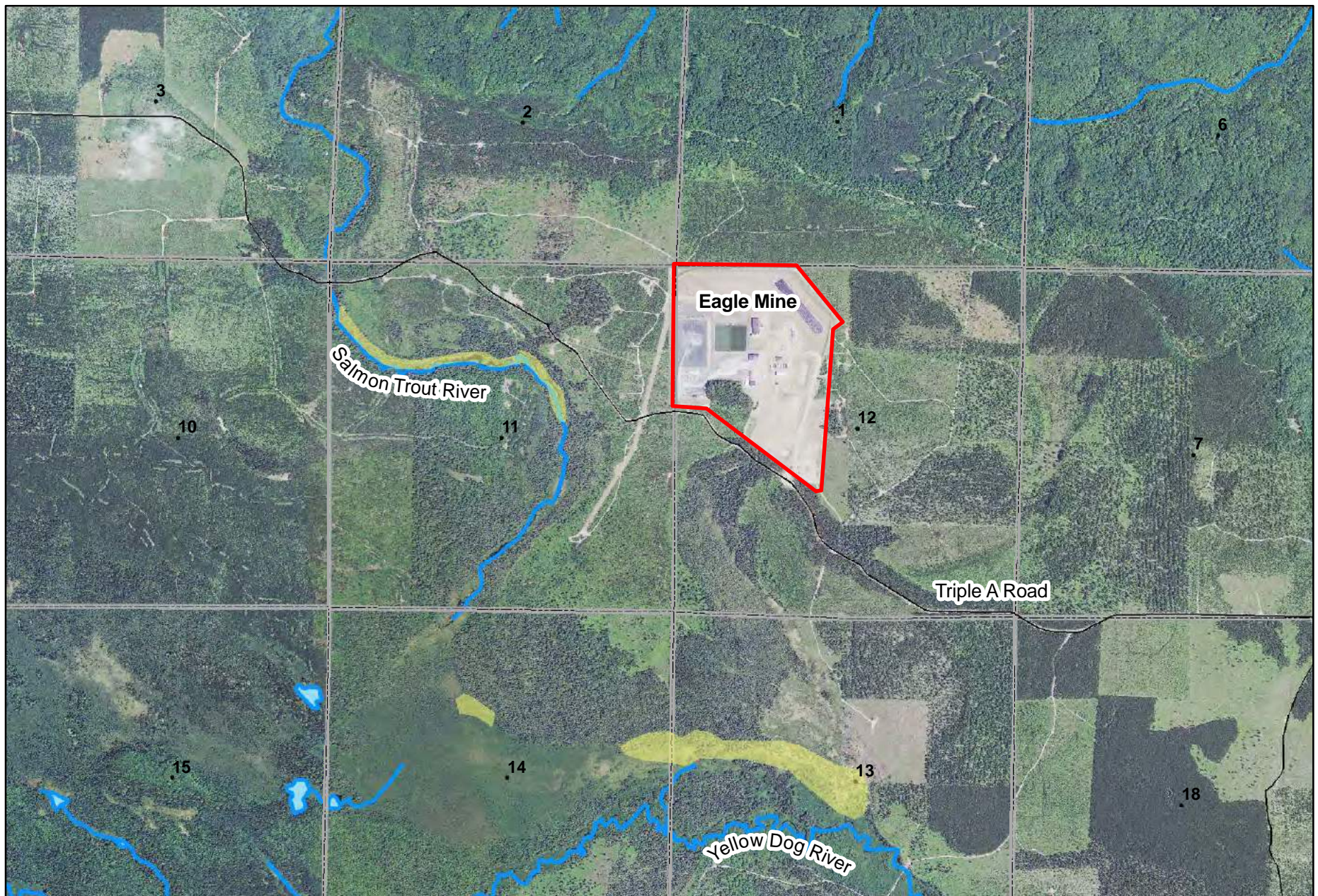
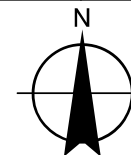
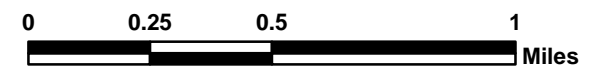


Figure 5-1. Narrow-leaved Gentian Survey (August 2015)



King & MacGregor Environmental, Inc.

Legend

Narrow-leaved Gentian

APPENDIX B: TABLES

Table 2-1a. Bird Survey Point Data - June 2015

Eagle Mine LLC

Survey Point	Date	Acadian Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	Black-capped Chickadee	Black-throated Green Warbler	Blue Jay	Blue-headed Vireo	Brown Thrasher	Canada Goose	Cedar Waxwing	Chipping Sparrow	Clay-colored Sparrow	Common Grackle	Common Raven	Dark-eyed Junco	Eastern Phoebe	Hermit Thrush	Nashville Warbler	Northern Flicker	Northern Harrier	Northern Parula	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Red-winged Blackbird	Ruby-crowned Kinglet	Sandhill Crane	Song Sparrow	Spruce Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Wilson's Snipe	Yellow-rumped Warbler	Total Count	Species Richness				
1	6/16/15								1												2					1														4	3			
1	6/17/15																1	2		3	1					2										1				10	6			
2	6/17/15																1	3		2	3					1														10	5			
2	6/19/15																	1	1	2			1			2		1								1				9	7			
3	6/17/15													1				1		3	4															1				10	5			
3	6/19/15																		3	1	3								1							2				10	5			
N ¹	6/17/15			1		2			1					2					3	5	7					1										1				23	9			
S ²	6/17/15		1						1			3							4	3	8				1		1										1				22	8		
N	6/18/15			1							1			2					3	1	1	6																			16	8		
S	6/18/15								2										3		5	1			1												2				14	6		
4	6/17/15																	1			3											2				1				8	5			
4	6/18/15					1					1								1	1																1				5	5			
5	6/17/15																		4	1	2															1				9	5			
5	6/18/15		1	1					1					1					2	2	2	1																			11	8		
6	6/17/15																		2		3																			6	3			
6	6/18/15				2				1					2						2																					7	4		
7	6/17/15			2															11	2															1						16	4		
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8	6/17/15																		1	2	2																				6	4		
8	6/18/15			2		2								2					1	1	2						1									1						11	7	
11	6/17/15					1													2		2					1																6	4	
11	6/19/15													3					1		1								1													7	5	
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12	6/17/15										1			1					5	4																	1				12	5		
13	6/15/15												1							1	3											1					2				8	5		
13	6/16/15		1			1														4	4																3				13	5		
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14	6/16/15		1							2										2	2					1	1		1									1				11	8	
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27	6/18/15	1							1											2	3				1		2											1				9	6	
27	6/19/15	1	1																	1	3			1	1	1		1			1						3					14	10	
28	6/17/15																			2	2									1												5	3	

Continued

Table 2-1a. Bird Survey Point Data - June 2015, Continued

Eagle Mine LLC

Survey Point	Date	Acadian Flycatcher	American Crow	American Goldfinch	American Redstart	American Robin	Black-capped Chickadee	Black-throated Green Warbler	Blue Jay	Blue-headed Vireo	Brown Thrasher	Canada Goose	Cedar Waxwing	Chipping Sparrow	Clay-colored Sparrow	Common Grackle	Common Raven	Dark-eyed Junco	Eastern Phoebe	Hermit Thrush	Nashville Warbler	Northern Flicker	Northern Harrier	Northern Parula	Ovenbird	Pine Warbler	Red-breasted Nuthatch	Red-eyed Vireo	Red-winged Blackbird	Ruby-crowned Kinglet	Sandhill Crane	Song Sparrow	Spruce Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Wilson's Snipe	Yellow-rumped Warbler	Total Count	Species Richness	
28	6/18/15				1											1		1		3	4														2		1		13	7	
29	6/17/15																			3	3				1	2										1		1	8	5	
29	6/18/15								1									1		3	5	1		1		1										2			17	10	
30	6/15/15						1												2	2	1	1			1	1		1						1						8	6
30	6/16/15				1				1										1	2					1												2			6	5
31	6/15/15	1			1																3								1								2			8	5
31	6/16/15												1					1			2							1	1							1				7	6
	Total	4	13	7	5	21	1	1	20	3	7	3	2	17	2	2	6	84	1	86	152	4	1	5	10	26	1	8	1	2	3	2	2	10	2	36	2	6	558	37	

N¹ - Meander North
S² - Meander South

Mean of Species Richness per Survey Point per Day 6
Mean Count per Species 15

Table 2-1b. Bird Species Abundance Rankings - June 2015

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Nashville Warbler	<i>Vermivora ruficapilla</i>	152	27.2%
Hermit Thrush	<i>Catharus guttatus</i>	86	15.4%
Dark-eyed Junco	<i>Junco hyemalis</i>	84	15.1%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	36	6.5%
Pine Warbler	<i>Dendroica pinus</i>	26	4.7%
American Robin	<i>Turdus migratorius</i>	21	3.8%
Blue Jay	<i>Cyanocitta cristata</i>	20	3.6%
Chipping Sparrow	<i>Spizella passerina</i>	17	3.0%
American Crow	<i>Corvus brachyrhynchos</i>	13	2.3%
Ovenbird	<i>Seiurus aurocapilla</i>	10	1.8%
Vesper Sparrow	<i>Pooecetes gramineus</i>	10	1.8%
Red-eyed Vireo	<i>Vireo olivaceus</i>	8	1.4%
American Goldfinch	<i>Spinus tristis</i>	7	1.3%
Brown Thrasher	<i>Toxostoma rufum</i>	7	1.3%
Common Raven	<i>Corvus corax</i>	6	1.1%
Yellow-rumped Warbler	<i>Dendroica coronata</i>	6	1.1%
American Redstart	<i>Setophaga ruticilla</i>	5	0.9%
Northern Parula	<i>Setophaga americana</i>	5	0.9%
Acadian Flycatcher	<i>Empidonax virescens</i>	4	0.7%
Northern Flicker	<i>Colaptes auratus</i>	4	0.7%
Blue-headed Vireo	<i>Vireo solitarius</i>	3	0.5%
Canada Goose	<i>Branta canadensis</i>	3	0.5%
Sandhill Crane	<i>Grus canadensis</i>	3	0.5%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	2	0.4%
Clay-colored Sparrow	<i>Spizella pallida</i>	2	0.4%
Common Grackle	<i>Quiscalus quiscula</i>	2	0.4%
Ruby-crowned Kinglet	<i>Regulus calendula</i>	2	0.4%
Song Sparrow	<i>Melospiza melodia</i>	2	0.4%
Spruce Grouse	<i>Falcapennis canadensis</i>	2	0.4%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	2	0.4%
Wilson's Snipe	<i>Gallinago delicata</i>	2	0.4%
Black-capped Chickadee	<i>Poecile atricapillus</i>	1	0.2%
Black-throated Green Warbler	<i>Dendroica virens</i>	1	0.2%
Eastern Phoebe	<i>Sayornis phoebe</i>	1	0.2%
Northern Harrier	<i>Circus cyaneus</i>	1	0.2%
Red-breasted Nuthatch	<i>Sitta canadensis</i>	1	0.2%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	1	0.2%

Total Count **558**
Mean Count per Species **15**
Total Number of Species **37**

Table 2-2a. Bird Survey Point Data - September 2015

Eagle Mine LLC

Survey Point	Date	American Crow	American Goldfinch	American Robin	Bald Eagle	Black-capped Chickadee	Blue Jay	Canada Goose	Cedar Waxwing	Chipping Sparrow	Clay-colored Sparrow	Common Raven	Dark-eyed Junco	Hairy Woodpecker	Hermit Thrush	Nashville Warbler	Northern Flicker	Northern Harrier	Palm warbler	Roughed Grouse	Spruce Grouse	Vesper Sparrow	White-breasted Nuthatch	White-throated Sparrow	Woodcock	Yellow-rumped warbler	Total Count	Species Richness
1	9/22/15						1	7		2				1													11	4
1	9/23/15						4		3																		7	2
2	9/24/15						1	2					3				1					2					9	5
2	9/30/15	3	3	1		2	2						1														12	6
3	9/22/15							15		1			1							2							19	4
3	9/23/15	1			1	2	1	14				2				3			1								25	8
4	9/24/15	1		1			1	42				4				1			3								53	7
4	9/30/15									1			3														4	2
11	9/22/15							10	5	4	6		3														28	5
11	9/23/15	2		2			1			2			1									4				2	14	7
12	9/24/15						2	107					2														111	3
12	9/30/15			3			1						2				1						1				8	5
13	9/22/15	1	1				1	2		1			2						1							2	11	8
13	9/23/15	1	1				1																				3	3
14	9/24/15						1	39																1			41	3
14	9/30/15					2		5		2			1									5					15	5
21	9/24/15	1					3						3														7	3
21	9/30/15						1						2										1				4	3
22	9/24/15			1			2	15									1										19	4
22	9/30/15	2		1			1						2														6	4
23	9/24/15			1			2																				3	2
23	9/23/15			2									7														9	2
24	9/24/15						1					1							1								3	3
24	9/30/15			1		3	2										1			1							8	5
25	9/24/15						2							1											1		4	3
25	9/30/15						1			1			3														5	3
26	9/24/15							2		2			4		1												9	4
26	9/30/15					5		5		3																	13	3
27	9/24/15	1					1					1															3	3
27	9/30/15					3	2	31	6					1							1						44	6
28	9/24/15	1					1																				2	2
28	9/30/15	1		1									2														4	3
29	9/30/15			5			2																				7	2
29	9/24/15	1					2																				3	2
30	9/24/15						1							1											1		3	3
30	9/30/15			1		2						2											1				6	4
31	9/24/15						3						3														6	2
31	9/30/15			1			1						1														3	3
Total		16	5	21	1	19	45	296	14	19	6	4	52	2	3	1	6	1	8	1	1	11	3	1	2	4	542	25

Mean of Species Richness per Survey Point per Day 4
Mean Count per Species 22

Table 2-2b. Bird Species Abundance Rankings - September 2015

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Canada Goose	<i>Branta canadensis</i>	296	54.6%
Dark-eyed Junco	<i>Junco hyemalis</i>	52	9.6%
Blue Jay	<i>Cyanocitta cristata</i>	45	8.3%
American Robin	<i>Turdus migratorius</i>	21	3.9%
Black-capped Chickadee	<i>Poecile atricapilla</i>	19	3.5%
Chipping Sparrow	<i>Spizella passerina</i>	19	3.5%
American Crow	<i>Corvus brachyrhynchos</i>	16	3.0%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	14	2.6%
Vesper Sparrow	<i>Poecetes gramineus</i>	11	2.0%
Palm Warbler	<i>Setophaga palmarum</i>	8	1.5%
Clay-colored Sparrow	<i>Spizella pallida</i>	6	1.1%
Northern Flicker	<i>Colaptes auratus</i>	6	1.1%
American Goldfinch	<i>Carduelis tristis</i>	5	0.9%
Common Raven	<i>Corvus corax</i>	4	0.7%
Yellow-rumped warbler	<i>Setophaga coronata</i>	4	0.7%
Hermit Thrush	<i>Catharus guttatus</i>	3	0.6%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	3	0.6%
Hairy Woodpecker	<i>Picoides villosus</i>	2	0.4%
Woodcock	<i>Scolopax minor</i>	2	0.4%
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	0.2%
Nashville Warbler	<i>Leiothlypis ruficapilla</i>	1	0.2%
Northern Harrier	<i>Circus cyaneus</i>	1	0.2%
Ruffed Grouse	<i>Bonasa umbellus</i>	1	0.2%
Spruce Grouse	<i>Falcipennis canadensis</i>	1	0.2%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	1	0.2%

Total Count	542
Mean Count per Species	22
Total Number of Species	25

Table 2-3. Bird Species Abundance Rankings - June/September Combined 2015

Eagle Mine LLC

Common Name	Scientific Name	Count	Relative Abundance
Canada Goose	<i>Branta canadensis</i>	299	27.2%
Nashville Warbler	<i>Vermivora ruficapilla</i>	153	13.9%
Dark-eyed Junco	<i>Junco hyemalis</i>	136	12.4%
Hermit Thrush	<i>Catharus guttatus</i>	89	8.1%
Blue Jay	<i>Cyanocitta cristata</i>	65	5.9%
American Robin	<i>Turdus migratorius</i>	42	3.8%
White-throated Sparrow	<i>Zonotrichia albicollis</i>	37	3.4%
Chipping Sparrow	<i>Spizella passerina</i>	36	3.3%
American Crow	<i>Corvus brachyrhynchos</i>	29	2.6%
Pine Warbler	<i>Dendroica pinus</i>	26	2.4%
Vesper Sparrow	<i>Poocetes gramineus</i>	21	1.9%
Black-capped Chickadee	<i>Poecile atricapilla</i>	20	1.8%
Cedar Waxwing	<i>Bombycilla cedrorum</i>	16	1.5%
American Goldfinch	<i>Carduelis tristis</i>	12	1.1%
Yellow-rumped Warbler	<i>Dendroica coronata</i>	10	0.9%
Common Raven	<i>Corvus corax</i>	10	0.9%
Northern Flicker	<i>Colaptes auratus</i>	10	0.9%
Ovenbird	<i>Seiurus aurocapilla</i>	10	0.9%
Clay-colored Sparrow	<i>Spizella pallida</i>	8	0.7%
Palm Warbler	<i>Setophaga palmarum</i>	8	0.7%
Red-eyed Vireo	<i>Vireo olivaceus</i>	8	0.7%
Brown Thrasher	<i>Toxostoma rufum</i>	7	0.6%
American Redstart	<i>Setophaga ruticilla</i>	5	0.5%
Northern Parula	<i>Setophaga americana</i>	5	0.5%
White-breasted Nuthatch	<i>Sitta carolinensis</i>	5	0.5%
Acadian Flycatcher	<i>Empidonax virescens</i>	4	0.4%
Sandhill Crane	<i>Grus canadensis</i>	3	0.3%
Spruce Grouse	<i>Falcipennis canadensis</i>	3	0.3%
Blue-headed Vireo	<i>Vireo solitarius</i>	3	0.3%
Common Grackle	<i>Quiscalus quiscula</i>	2	0.2%
Hairy Woodpecker	<i>Picoides villosus</i>	2	0.2%
Northern Harrier	<i>Circus cyaneus</i>	2	0.2%
Ruby-crowned Kinglet	<i>Regulus calendula</i>	2	0.2%
Song Sparrow	<i>Melospiza melodia</i>	2	0.2%
Wilson's Snipe	<i>Gallinago delicata</i>	2	0.2%
Woodcock	<i>Scolopax minor</i>	2	0.2%
Bald Eagle	<i>Haliaeetus lurocephalus</i>	1	0.1%
Black-throated Green Warbler	<i>Dendroica virens</i>	1	0.1%
Eastern Phoebe	<i>Sayornis phoebe</i>	1	0.1%
Red-breasted Nuthatch	<i>Sitta canadensis</i>	1	0.1%
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	1	0.1%
Roughed Grouse	<i>Bonasa umbellus</i>	1	0.1%

Total Count 1100
Mean Count per Species 20
Total Number of Species 42

Table 3. Small Mammal Survey Point Data - 2015

Eagle Mine LLC

Survey Point	Date	Sherman Live Traps (2)				Large Snap Trap		Small Snap Trap				Total Count	Species Richness
		American Water Shrew (<i>Sorex palustris</i>)	Deer Mouse (<i>Peromyscus maniculatus</i>)	Least Chipmunk (<i>Tamias minimus</i>)	Southern Redback Vole (<i>Clethrionomys gapperi</i>)	Eastern Chipmunk (<i>Tamias striatus</i>)	Least Chipmunk (<i>Tamias minimus</i>)	American Pygmy Shrew (<i>Sorex hoyi</i>)	Deer Mouse (<i>Peromyscus maniculatus</i>)	Least Chipmunk (<i>Tamias minimus</i>)	Northern Short-tailed Shrew (<i>Blarina brevicauda</i>)		
1	9/22/15			1								1	1
1	9/23/15												
1	9/24/15									1		1	1
3	9/22/15									1		1	1
3	9/23/15												
3	9/24/15												
11	9/22/15												
11	9/23/15		1						1			2	1
11	9/24/15						1					1	1
13	9/22/15												
13	9/23/15												
13	9/24/15												
22	9/22/15								1			1	1
22	9/23/15			1								1	1
22	9/24/15					1						1	1
23	9/22/15												
23	9/23/15		1	1								2	2
23	9/24/15		1	1			1					3	2
25	9/22/15												
25	9/23/15												
25	9/24/15												
27	9/22/15	1										1	1
27	9/23/15												
27	9/24/15										1	1	1
29	9/22/15												
29	9/23/15				1			1				2	2
29	9/24/15				1			1				2	2
31	9/22/15		1									1	1
31	9/23/15		1									1	1
31	9/24/15		1									1	1
Total		1	6	4	2	1	2	2	2	2	1	23	7

Mean Species Richness per Survey Point per Day 1.2

Mean Count per Species 1.9

Table 4. Frog and Toad Survey Point Data - 2015

Eagle Mine LLC

						Call Index Value*			Species Richness
Survey Point	Survey Period	Date	Time	Temp (°F)	Wind Speed (MPH)	American Toad (<i>Bufo americanus</i>)	Green Frog (<i>Rana clamitans</i>)	Northern Spring Peeper (<i>Pseudacris crucifer</i>)	
FT01	Early Spring	4/16/15	8:49 PM	53.5	0				
FT02	Early Spring	4/16/15	8:30 PM	54.0	0				
FT03	Early Spring	4/16/15	9:50 AM	46.8	0				
FT01	Late Spring	6/2/15	9:40 PM	68.6	0			3	1
FT02	Late Spring	6/2/15	9:57 PM	65.3	0			3	1
FT03	Late Spring	6/2/15	10:32 PM	68.0	0			3	1
FT01	Summer	6/29/15	9:48 AM	70.2	0		1		1
FT02	Summer	6/29/15	10:02 AM	69.8	0		1		1
FT03	Summer	6/29/15	10:35 AM	67.1	0	1	2		1
					Mean	1	1.3	3	1
					Total				3
Mean Call Index Value per Survey Point per Day									1.8

*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.

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2015

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native	Herbaceous Species Percent Cover Per 1m Quadrat							
							Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 13W	Plot 26W
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes			5			5		
<i>Agrostis scabra</i>	Tickle-grass	4	FAC	0	Herb	Yes					5			
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	NA	S/T	Yes				5				
<i>Anemone quinquefolia</i>	Wood Anemone	5	FACU	3	Herb	Yes	5							
<i>Avenella flexuosa</i>	Wavy Hair Grass	6	UPL	5	Herb	Yes					20			
<i>Brachyelytrum erectum</i>	Short-glume Grass	7	FACU	3	Herb	Yes	10							
<i>Calamagrostis canadensis</i>	Blue-joint	3	OBL	-5	Herb	Yes		5	10	5			5	
<i>Carex brunnescens</i>	Brownish Sedge	5	FACW	-3	Herb	Yes			5					
<i>Carex leptalea</i>	Bristly-stalk Sedge	5	OBL	-5	Herb	Yes	20							
<i>Carex oligosperma</i>	Few-seeded Sedge	10	OBL	-5	Herb	Yes								5
<i>Carex stricta</i>	Tussock Sedge	4	OBL	-5	Herb	Yes	45	60					20	
<i>Carex trisperma</i>	Three-seeded Sedge	9	OBL	-5	Herb	Yes						5		
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes								5
<i>Coptis trifolia</i>	Goldthread	5	FACW	-3	Herb	Yes				5		5		
<i>Cornus canadensis</i>	Bunchberry, Dwarf Cornel	6	FAC	0	Herb	Yes				5	5	5		
<i>Danthonia spicata</i>	Poverty Grass	4	UPL	5	Herb	Yes					20			
<i>Diervilla lonicera</i>	Bush Honeysuckle	4	UPL	5	Shrub	Yes					5			
<i>Dryopteris carthusiana</i>	Spinulose Woodfern	5	FACW	-3	Herb	Yes	5							
<i>Dryopteris intermedia</i>	Intermediate Fern	5	FAC	0	Herb	Yes						10		
<i>Epigaea repens</i>	Trailing Arbutus	7	UPL	5	Herb	Yes				10				
<i>Hieracium aurantiacum</i>	Orange Hawkweed	0	UPL	5	Herb	No					15			
<i>Hieracium caespitosum</i>	Yellow Hawkweed	0	UPL	5	Herb	No				20				
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	-5	Herb	Yes							5	
<i>Kalmia polifolia</i>	Bog-laurel	10	OBL	-5	Shrub	Yes								10
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes			10		5			
<i>Osmunda cinnamomea</i>	Cinnamon Fern	5	FACW	-3	Herb	Yes						10		
<i>Oxalis acetosella</i>	Northern Wood Sorrel	7	FACU	3	Herb	Yes						5		
<i>Panax trifolius</i>	Dwarf Ginseng	8	UPL	5	Herb	Yes					5			
<i>Phleum pratense</i>	Timothy	0	FACU	3	Herb	No					5			
<i>Potentilla palustris</i>	Marsh Cinquefoil	7	OBL	-5	Herb	Yes		5						
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes				5				
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes	5							
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes					5			

Table 6a. Herbaceous Species Wetland Vegetative Survey Data - June 2015

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native	Herbaceous Species Percent Cover Per 1m Quadrat							
							Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 13W	Plot 26W
<i>Rhododendron groenlandicum</i>	Labrador Tea	8	OBL	-5	Shrub	Yes								40
<i>Rubus pubescens</i>	Dwarf Raspberry	4	FACW	-3	Herb	Yes	5							
<i>Rubus setosus</i>	Setose Blackberry	3	FACW	-3	Shrub	Yes			5		5			
<i>Solidago juncea</i>	Early Goldenrod	3	UPL	5	Herb	Yes				5				
<i>Thalictrum dasycarpum</i>	Hairy-fruit Meadow-rue	3	FACW	-3	Herb	Yes	5							
<i>Trientalis borealis</i>	Starflower	5	FAC	0	Herb	Yes			5					
<i>Utricularia sp.</i>	Bladderwort	0	OBL	-5	Herb	Yes		5						
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes				50	30	5		
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW	-3	Herb	Yes					10			
NA	Dead Vegetation	NA	NA	NA	NA	NA		50	20	5			75	
NA	Duff / Bare Soil	NA	NA	NA	NA	NA	10				5			
NA	Moss	NA	NA	NA	Moss	Yes			5	15		20		95

Total Number of Species	8	4	6	9	13	8	3	4
Total Number of Native Species	8	4	6	8	11	8	3	4
Mean Wetland Indicator Value (W)	-1.3	-5.0	-1.8	1.4	2.2	-0.6	-5.0	-5.0
Mean Coefficient of Conservatism (C)	4.4	3.5	3.5	3.3	3.6	5.3	4.0	9.0
Floristic Quality Index (FQI)	12.4	7.0	8.6	10.0	13.0	14.8	6.9	18.0

Table 6b. Woody Species Wetland Vegetative Survey Data - June 2015

Eagle Mine LLC

							Woody Species Stems Per Permanent 30' Radius Plot							
Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native	Plot 1W	Plot 6W	Plot 7W	Plot 8W	Plot 9W	Plot 10W	Plot 13W	Plot 26W
<i>Abies balsamea</i>	Balsam Fir	3	FACW	-3	Tree	Yes	24		9	69	19	16	2	
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes	47		180	25	48	192		
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	FACW	-5	Shrub	Yes	83	56	3					
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	NA	S/T	Yes	4		11	4	7		1	
<i>Aronia prunifolia (A. melanocarpa)</i>	Chokeberry	5	FACW	-3	Shrub	Yes							1	
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	Tree	Yes			5	9	9			
<i>Corylus cornuta</i>	Beaked Hazelnut	5	FACU	3	Shrub	Yes					5			
<i>Larix laricina</i>	Tamarack	5	FACW	-3	Tree	Yes		1				7	3	9
<i>Lonicera canadensis</i>	Canada Honeysuckle	5	FACU	3	Shrub	Yes	8							
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	Yes						5	1	
<i>Picea mariana</i>	Black Spruce	6	FACW	-3	Tree	Yes	20			46	14	25	17	25
<i>Pinus banksiana</i>	Jack Pine	5	FACU	3	Tree	Yes			3	19	12		1	
<i>Pinus resinosa</i>	Red Pine	6	FACU	3	Tree	Yes			2					
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes								2
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes			8		4			
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU	3	Tree	Yes					5			
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes	9		32	12	19			
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes	20							
<i>Salix discolor</i>	Pussy Willow	1	FACW	-3	Shrub	Yes			1					
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes				1				
Total Number of Species							8	2	10	8	10	5	7	3
Total Number of Native Species							8	2	10	8	10	5	7	3
Mean Wetland Indicator Value (W)							-0.3	-4.0	0.1	0.8	0.9	-2.8	-2.0	-1.0
Mean Coefficient of Conservatism (C)							3.0	5.0	2.6	2.9	2.8	4.4	4.4	4.7
Floristic Quality Index (FQI)							8.5	7.1	8.2	8.1	8.9	9.8	11.7	8.1

Table 6c. Overall Wetland Vegetative Survey Data - June 2015

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 scabra</i>	Ticklegrass	4	FAC	0	Herb	Yes
<i>Alnus incana</i> ssp. <i>rugosa</i>	Speckled Alder	5	FACW	-3	Shrub	Yes
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	NA	S/T	Yes
<i>Anemone quinquefolia</i>	Wood Anemone	5	FAC	0	Herb	Yes
<i>Aronia prunifolia</i> (A. <i>melanocarpa</i>)	Chokeberry	5	FACW	-3	Shrub	Yes
<i>Avenella flexuosa</i>	Flexuosa Hair-grass	6	UPL	5	Herb	Yes
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	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 brunnescens</i>	Brownish Sedge	5	FACW	-3	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>	Tussock 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>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	FACU	3	Shrub	Yes
<i>Danthonia spicata</i>	Poverty Grass	4	UPL	5	Herb	Yes
<i>Diervilla lonicera</i>	Bush-Honeysuckle	4	UPL	5	Shrub	Yes
<i>Dryopteris carthusiana</i>	Spinulose Woodfern	5	FACW	-3	Herb	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>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>Lonicera canadensis</i>	Canada Honeysuckle	5	FACU	3	Shrub	Yes
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	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 Ginseng	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
<i>Potentilla palustris</i>	Marsh Cinquefoil	7	OBL	-5	Herb	Yes
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU	3	Tree	Yes
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes
<i>Rhododendron groenlandicum</i>	Labrador-Tea	8	OBL	-5	Shrub	Yes

Table 6c. Overall Wetland Vegetative Survey Data - June 2015

Eagle Mine LLC

Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	Native
<i>Rubus pubescens</i>	Dwarf Raspberry	4	FACW	-3	Herb	Yes
<i>Rubus setosus</i>	Setose Blackberry	3	FACW	-3	Shrub	Yes
<i>Salix discolor</i>	Pussy Willow	1	FACW	-3	Shrub	Yes
<i>Salix humulis</i>	Prairie Willow	4	FACU	3	Shrub	Yes
<i>Solidago juncea</i>	Early Goldenrod	3	UPL	5	Herb	Yes
<i>Thalictrum dasycarpum</i>	Hairy-fruit Meadow-rue	3	FACW	-3	Herb	Yes
<i>Trientalis borealis</i>	Star Flower	5	FAC	0	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	-3	Herb	Yes

Total Number of Species	58
Total Number of Native Species	55
Mean Wetland Indicator Value (W)	-0.3
Mean Coefficient of Conservatism (C)	4.4
Floristic Quality Index (FQI)	33.8

Table 7-1a. Herbaceous Species Upland Vegetative Survey Data - June 2015

Eagle Mine LLC

							Herbaceous Species Percent Cover Per 1m Quadrat																								
Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	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	-3	Tree	Yes																5	10								
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes									5				10	5		5	10								
<i>Agrostis gigantea</i>	Redtop	NA	FACW	-3	Herb	No							10						10												
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	NA	S/T	Yes									5		5			5											
<i>Aronia prunifolia</i>	Chokeberry	5	FACW	-3	Shrub	Yes														5											
<i>Avenella flexuosa</i>	Hair-grass	6	UPL	5	Herb	Yes		5						5		10		5	5		5			5							
<i>Carex lucorum</i>	Blue Ridge Sedge	4	UPL	5	Herb	Yes				30	15																				
<i>Carex stricta</i>	Tussock Sedge	4	OBL	-5	Herb	Yes														70											
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes														5											
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC	0	Herb	Yes											5			5		5									
<i>Coptis trifolia</i>	Goldthread	5	FACW	-3	Herb	Yes											5			5		5	5								
<i>Cornus canadensis</i>	Bunchberry	6	FAC	0	Herb	Yes											5			5		5	5								
<i>Cypripedium acaule</i>	Pink Lady-slipper	5	FACW	-3	Herb	Yes													5												
<i>Danthonia spicata</i>	Poverty Grass	4	UPL	5	Herb	Yes		5	10						5						20										
<i>Epigaea repens</i>	Trailing Arbutus	7	UPL	5	Herb	Yes	10	15						5				5													
<i>Gaultheria hispida</i>	Creeping Snowberry	8	FACW	-3	Herb	Yes														5											
<i>Gaultheria procumbens</i>	Wintergreen	5	FACU	3	Herb	Yes	5				15				5	5	10		5	5		5									
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	-5	Herb	Yes														5											
<i>Kalmia polifolia</i>	Bog-laurel	10	OBL	-5	Shrub	Yes											5														
<i>Linnaea borealis</i>	Twinflower	6	FAC	0	Herb	Yes	5																								
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes	5	5		5	5		5									5	5	5							
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes										5															
<i>Polygala paucifolia</i>	Fringed Polygala	7	FACU	3	Herb	Yes	5																								
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes										45															
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes																	5								
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes	15				5		5	5	5	5		5	30		5			20							
<i>Rhododendron groenlandicum</i>	Labrador Tea	8	OBL	-5	Shrub	Yes											25			5											
<i>Rubus hispidus</i>	Swamp Dewberry	4	FACW	-3	Shrub	Yes														5											
<i>Trientalis borealis</i>	Starflower	5	FAC	0	Herb	Yes							5								5										
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes	10	5	15	50	5	85	5	35	35		20	5	5	5	5		5	10							
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW	-3	Herb	Yes	5	15			20			5	5	5						50	10								
NA	Duff / Bare Soil	NA	NA	NA	NA	NA	30		45	10			70	65	50	80	10	20	80		50	50	60	80							
NA	Lichen	NA	NA	NA	Lichen	Yes	5	90		10				10				10													
NA	Moss	NA	NA	NA	Moss	Yes	5				95	95		10		5	50	80	5	80	5	50	5	30							
Total Number of Species							8	6	3	3	5	1	5	5	9	4	8	4	6	14	5	8	8	4							
Total Number of Native Species							8	6	3	3	5	1	4	5	9	4	8	4	6	14	5	8	8	4							
Mean Wetland Indicator Value (W)							1.8	2.5	4.3	2.7	1.2	3.0	0.6	2.6	1.6	2.0	-0.9	4.0	1.8	-1.9	3.2	-0.8	-0.4	2.8							
Mean Coefficient of Conservatism (C)							4.6	4.8	4.0	4.0	3.4	4.0	4.0	4.2	2.4	3.8	5.4	4.3	3.5	4.9	3.8	4.1	3.6	3.5							
Floristic Quality Index (FQI)							13.1	11.8	6.9	6.9	7.6	4.0	8.9	9.4	7.3	7.5	15.2	8.5	8.6	18.2	8.5	11.7	10.3	7.0							

Table 7-1b. Woody Species Upland Vegetative Survey Data - June 2015

Eagle Mine LLC

							Woody Species Stems Per Permanent 30-Foot Radius Circular Plot																		
Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	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	-3	Tree	Yes	10	1			1		1		2	1	4	2	6			13	19	22	
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes	45				5			7	1	7	31	6	16	91	13	19	8	17	
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	FACW	-5	Shrub	Yes														43					
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	NA	S/T	Yes	10				3			1	4	4	5			8	8	6		3	
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	Tree	Yes										1				1		1	1	1	
<i>Corylus cornuta</i>	Beaked Hazelnut	5	UPL	5	Shrub	Yes																	1		
<i>Larix laricina</i>	Tamarack	5	FACW	-3	Tree	Yes					6						1			7					
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	Yes											5			2		5			
<i>Picea glauca</i>	White Spruce	3	FACU	3	Tree	Yes									1										
<i>Picea mariana</i>	Black Spruce	6	FACW	-3	Tree	Yes	16	31			23	62	1	23		1	25	10		81	1	17		18	
<i>Pinus banksiana</i>	Jack Pine	5	FACU	3	Tree	Yes	17	2	16	32	24	32	2	10	22	21		11	8		7			11	
<i>Pinus resinosa</i>	Red Pine	6	FACU	3	Tree	Yes															7				
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes	2				1			2	5	2	2	4	5		2	4	3		
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes									44	1			2		55				
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU	3	Tree	Yes										3					1				
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes									25	18		3			22			2	
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes															1				
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes	4							1											
Total Number of Species							7	3	1	1	6	3	3	6	8	10	7	6	5	7	10	7	5	7	
Total Number of Native Species							7	3	1	1	6	3	3	6	8	10	7	6	5	7	10	7	5	7	
Mean Wetland Indicator Value (W)							0.4	-1.0	3.0	3.0	0.0	-1.0	-1.0	1.0	1.1	0.9	-1.6	0.5	0.6	-1.9	1.5	-0.7	1.6	0.4	
Mean Coefficient of Conservatism (C)							3.1	4.7	5.0	5.0	3.0	5.3	4.7	3.2	2.3	2.6	3.6	3.3	2.6	3.7	2.9	3.1	2.8	2.7	
Floristic Quality Index (FQI)							8.3	8.1	5.0	5.0	7.3	9.2	8.1	7.8	6.4	8.2	9.4	8.2	5.8	9.8	9.2	8.3	6.3	7.2	

Table 7-1c. Overall Upland Vegetative Survey Data - June 2015

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>	Redtop	NA	FACW	-3	Herb	No
<i>Alnus incana</i> ssp. <i>rugosa</i>	Speckled Alder	5	FACW	-3	Shrub	Yes
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	NA	S/T	Yes
<i>Aronia prunifolia</i> (A. <i>melanocarpa</i>)	Chokeberry	5	FACW	-3	Shrub	Yes
<i>Avenella flexuosa</i>	Hair-grass	6	UPL	5	Herb	Yes
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	Tree	Yes
<i>Carex lucorum</i>	Lucorum Sedge	4	UPL	5	Herb	Yes
<i>Carex stricta</i>	Tussock Sedge	4	OBL	-5	Herb	Yes
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes
<i>Clintonia borealis</i>	Blue Beadlily	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>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>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>Linnaea borealis</i>	Twinflower	6	FAC	0	Herb	Yes
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	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	3	Tree	Yes
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes
<i>Rhododendron groenlandicum</i>	Labrador-Tea	8	OBL	-5	Shrub	Yes
<i>Rubus hispidus</i>	Swamp Dewberry	4	FACW	-3	Herb	Yes
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes
<i>Trientalis borealis</i>	Starflower	5	FAC	0	Herb	Yes
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW	-3	Herb	Yes

Total Number of Species	43
Total Number of Native Species	42
Mean Wetland Indicator Value (W)	0.0
Mean Coefficient of Conservatism (C)	4.7
Floristic Quality Index (FQI)	30.7

Table 7-2a. Herbaceous Species Upland Vegetative Survey Data - August 2015

Eagle Mine LLC

							Herbaceous Species Percent Cover Per 1m Quadrat																				
Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	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	-3	Tree	Yes																5	10				
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes	5								5				10	10			10				
<i>Agrostis gigantea</i>	Redtop	NA	FACW	-3	Herb	No							60														
<i>Agrostis scabra</i>	Rough Bent	4	FAC	0	Herb	Yes			5																		
<i>Amelanchier</i> sp.	Serviceberry	NA	NA	NA	S/T	Yes		5							5		5			5							
<i>Arabis hirsuta</i>	Hairy-eared Rockcress	6	FACU	3	Herb	Yes			5																		
<i>Avenella flexuosa</i>	Hair-grass	6	UPL	5	Herb	Yes		5						5	5	30		10	10		15			5			
<i>Carex lucorum</i>	Blue Ridge Sedge	4	UPL	5	Herb	Yes			65																		
<i>Carex lupulina</i>	Hop Sedge	4	OBL	5	Herb	Yes				15																	
<i>Carex stricta</i>	Tussock Sedge	4	OBL	-5	Herb	Yes														60							
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes														5							
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC	0	Herb	Yes											5				5						
<i>Coryza canadensis</i>	Horseweed	0	FACU	3	Herb	Yes			5																		
<i>Coptis trifolia</i>	Goldthread	5	FACW	-3	Herb	Yes											5			5			5				
<i>Cornus canadensis</i>	Bunchberry	6	FAC	0	Herb	Yes											5			5		5	5				
<i>Cypripedium acaule</i>	Pink Lady-slipper	5	FACW	-3	Herb	Yes													5								
<i>Danthonia spicata</i>	Poverty Grass	4	UPL	5	Herb	Yes									5						10						
<i>Epigaea repens</i>	Trailing Arbutus	7	UPL	5	Herb	Yes	15	20						5				10									
<i>Gaultheria hispida</i>	Creeping Snowberry	8	FACW	-3	Herb	Yes														5							
<i>Gaultheria procumbens</i>	Wintergreen	5	FACU	3	Herb	Yes	15				25				5	5	15		5	5		10					
<i>Iris versicolor</i>	Varicolored Iris	5	OBL	-5	Herb	Yes														5							
<i>Linnaea borealis</i>	American Twinflower	6	FAC	0	Herb	Yes	5																				
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes	5																5	5			
<i>Melampyrum lineare</i>	Narrow leaf Cow Weat	6	FACU	3	Herb	Yes	5																				
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes									5												
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes									40												
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes																	5				
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes	90	10		15	10			25	40	100		40	75		55	15		75			
<i>Rhododendron groenlandicum</i>	Labrador Tea	8	OBL	-5	Shrub	Yes											15			5							
<i>Trientalis borealis</i>	Starflower	5	FAC	0	Herb	Yes															5						
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes	5	10	10	65	15	75		20	30		40	20	10		5		5	15			
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW	-3	Herb	Yes	5	30			10	5		5		10						45	10				
NA	Duff / Bare Soil	NA	NA	NA	NA	NA	20			5		5	40	35	50	40	15	10	50		50	45	75	70			
NA	Lichen	NA	NA	NA	Lichen	Yes	5	60		10				5		5		5									
NA	Moss	NA	NA	NA	Moss	Yes	10				80	95		5		5	35	90	5	90	10	40	5	25			

Total Number of Species
Total Number of Native Species
Mean Wetland Indicator Value (W)
Mean Coefficient of Conservatism (C)
Floristic Quality Index (FQI)

9	6	5	3	4	2	1	5	9	4	7	4	6	10	5	6	8	4
9	6	5	3	4	2	0	5	9	4	7	4	6	10	5	6	8	4
1.6	2.2	2.8	3.7	1.5	0.0	N/A	2.6	2.4	2.0	-0.3	4.0	1.8	-2.3	3.2	0.0	-0.4	2.8
4.1	3.5	3.6	2.7	3.3	4.0	N/A	4.2	2.7	3.8	4.7	4.3	3.5	5.0	3.8	3.8	3.6	3.5
12.3	8.6	8.0	4.6	6.5	5.7	N/A	9.4	8.0	7.5	12.5	8.5	8.6	15.8	8.5	9.4	10.3	7.0

Table 7-2b. Woody Species Upland Vegetative Survey Data - August 2015

Eagle Mine LLC

							Woody Species Stems Per Permanent 30' Foot Radius Plot																						
Scientific Name	Common Name	C	Wet Code	Wet #	Growth Habit	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	-3	Tree	Yes	10	1			1		1		2	1	5	2	6		1	15	19	28					
<i>Acer rubrum</i>	Red Maple	1	FAC	0	Tree	Yes	41				6			8	3	8	35	8	25	101	21	33	8	24					
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	FACW	-3	Shrub	Yes														32									
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	NA	S/T	Yes	5				3			1	2	4	1			10	17	7		4					
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	Tree	Yes										1				1	1		1	1					
<i>Larix laricina</i>	Tamarack	5	FACW	-3	Tree	Yes						5					2			7									
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	Yes											19			6		5							
<i>Picea glauca</i>	White Spruce	3	FACU	3	Tree	Yes									1														
<i>Picea mariana</i>	Black Spruce	6	FACW	-3	Tree	Yes	18	29			30	65	1	27		1	26	11		73	1	20		17					
<i>Pinus banksiana</i>	Jack Pine	5	FACU	3	Tree	Yes	17	2	15	34	24	30	1	11	36	18		11	8		7			11					
<i>Pinus resinosa</i>	Red Pine	6	FACU	3	Tree	Yes															8								
<i>Pinus strobus</i>	White Pine	3	FACU	3	Tree	Yes	2				1			3	6	1	2	4	7		2	6	4						
<i>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes									46	1			2		49								
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU	3	Tree	Yes										7					1								
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes									23	19		3			23			5					
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes															1								
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes	5	1			1			2															
Total Number of Species							7	4	1	1	7	3	3	6	8	10	7	6	5	7	12	6	4	7					
Total Number of Native Species							7	4	1	1	7	3	3	6	8	10	7	6	5	7	12	6	4	7					
Mean Wetland Indicator Value (W)							0.4	0.0	3.0	3.0	0.4	-1.0	-1.0	1.0	1.1	0.9	-1.6	0.5	0.6	-1.6	1.3	-1.3	0.8	0.4					
Mean Coefficient of Conservatism (C)							3.1	4.5	5.0	5.0	3.1	5.3	4.7	3.2	2.3	2.6	3.6	3.3	2.6	3.7	2.8	3.3	2.3	2.7					
Floristic Quality Index (FQI)							8.3	9.0	5.0	5.0	8.3	9.2	8.1	7.8	6.4	8.2	9.4	8.2	5.8	9.8	9.8	8.2	4.5	7.2					

Table 7-2c. Overall Upland Vegetative Survey Data - August 2015
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>	Redtop	NA	FACW	-3	Herb	No
<i>Agrostis scabra</i>	Rough Bent	4	FAC	0	Herb	Yes
<i>Alnus incana ssp. rugosa</i>	Speckled Alder	5	FACW	-3	Shrub	Yes
<i>Amelanchier sp.</i>	Serviceberry	NA	NA	NA	S/T	Yes
<i>Arabis hirsuta</i>	Hairy-eared Rockcress	6	FACU	3	Herb	Yes
<i>Avenella flexuosa</i>	Hair-grass	6	UPL	5	Herb	Yes
<i>Betula papyrifera</i>	Paper Birch	2	FACU	3	Tree	Yes
<i>Carex lucorum</i>	Blue Ridge Sedge	4	UPL	5	Herb	Yes
<i>Carex lupulina</i>	Hop Sedge	4	OBL	5	Herb	Yes
<i>Carex stricta</i>	Tussock Sedge	4	OBL	-5	Herb	Yes
<i>Chamaedaphne calyculata</i>	Leatherleaf	8	OBL	-5	Shrub	Yes
<i>Clintonia borealis</i>	Blue Beadlily	5	FAC	0	Herb	Yes
<i>Conyza canadensis</i>	Horseweed	0	FACU	3	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>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>Larix laricina</i>	Tamarack	5	FACW	-3	Tree	Yes
<i>Linnaea borealis</i>	American Twinflower	6	FAC	0	Herb	Yes
<i>Maianthemum canadense</i>	Canada Mayflower	4	FAC	0	Herb	Yes
<i>Melampyrum lineare</i>	Narrow leaf Cow Weat	6	FACU	3	Herb	Yes
<i>Nemopanthus mucronatus</i>	Mountain Holly	7	OBL	-5	Shrub	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>Populus tremuloides</i>	Quaking Aspen	1	FAC	0	Tree	Yes
<i>Prunus pensylvanica</i>	Bird Cherry	3	FACU	3	Tree	Yes
<i>Prunus serotina</i>	Black Cherry	2	FACU	3	Tree	Yes
<i>Prunus virginiana</i>	Choke Cherry	2	FACU	3	Shrub	Yes
<i>Pteridium aquilinum</i>	Bracken Fern	0	FACU	3	Herb	Yes
<i>Rhododendron groenlandicum</i>	Labrador-Tea	8	OBL	-5	Shrub	Yes
<i>Salix humilis</i>	Prairie Willow	4	FACU	3	Shrub	Yes
<i>Trientalis borealis</i>	Starflower	5	FAC	0	Herb	Yes
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	4	FACU	3	Shrub	Yes
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	4	FACW	-3	Herb	Yes

Total Number of Species	43
Total Number of Native Species	42
Mean Wetland Indicator Value (W)	0.4
Mean Coefficient of Conservatism (C)	4.4
Floristic Quality Index (FQI)	28.9

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**



Robust population of NLG North of Yellow Dog River



Individuals north of the Yellow Dog River beginning to senesce



Typical NLG Specimen



NLG North of Yellow Dog River



NLG East side of Salmon Trout River



NLG East side of Salmon Trout River

**APPENDIX E:
WETLAND VEGETATIVE SURVEY PHOTOGRAPHS**

(All photos taken during June, 2015)

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 13W, north view

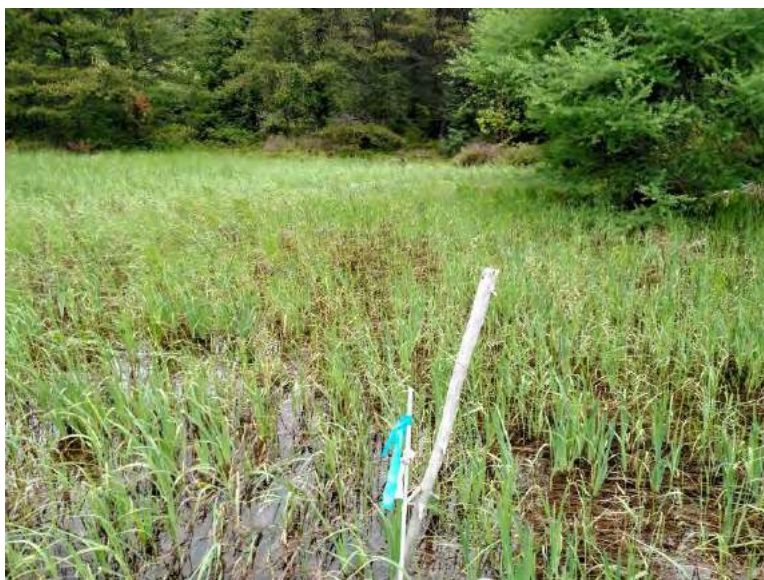


Photo 20. Plot 13W, south view



Photo 21. Plot 13W, quadrat view

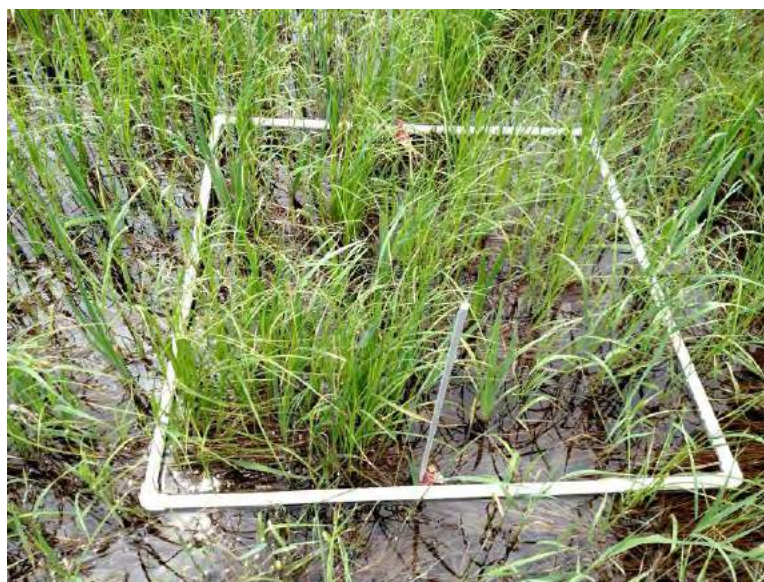


Photo 22. Plot 26W, north view



Photo 23. Plot 26W, south view



Photo 24. Plot 26W, quadrat view



**APPENDIX F:
UPLAND VEGETATIVE SURVEY PHOTOGRAPHS**

(All photos taken during August, 2015)

Photo 1. Plot 1, north view



Photo 2. Plot 1, south view



Photo 3. Plot 1, quadrat view



Photo 4. Plot 2, north view

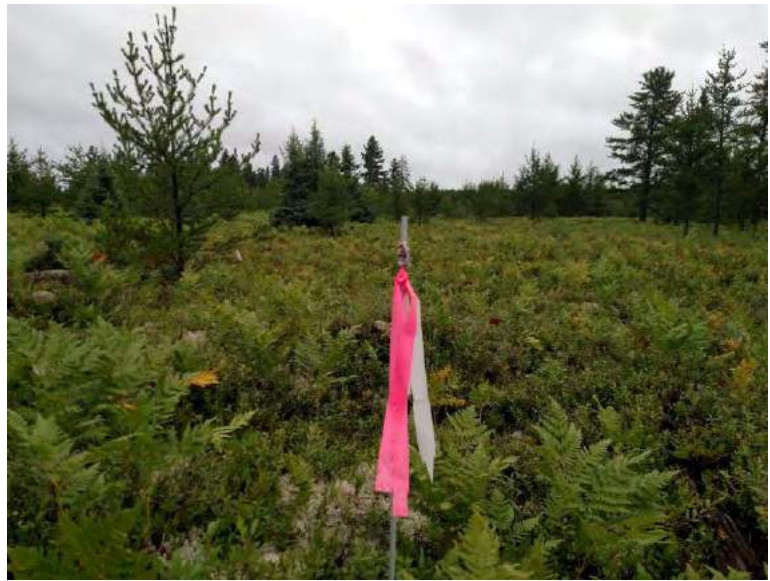


Photo 5. Plot 2, south view



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

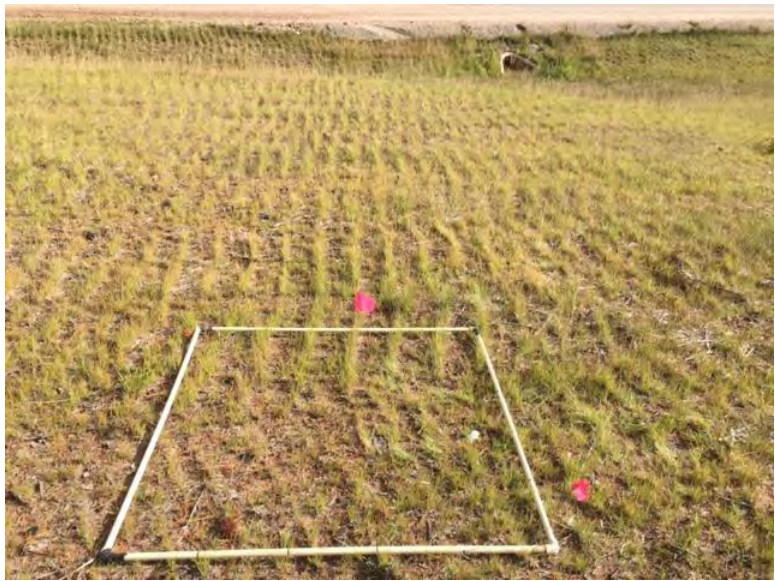


Photo 20. Plot 14, south view



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

