

***2010 Wild Rice and Water Quality Monitoring  
Report***

***Second Creek, Spring Mine Creek, Trimble Creek,  
Unnamed Creek (PM 11), Wyman Creek, Embarrass  
River, Partridge River, Pike River, and St. Louis  
River***

***Prepared for  
PolyMet Mining Inc. – NorthMet Project***

***January 2011***



## ***2010 Wild Rice and Water Quality Monitoring***

***Second Creek, Spring Mine Creek, Trimble Creek,  
Unnamed Creek (PM 11), Wyman Creek, Embarrass  
River, Partridge River, Pike River, and St. Louis  
River***

***Prepared for  
PolyMet Mining Inc. – NorthMet Project***

***January 2011***



4700 West 77<sup>th</sup> Street  
Minneapolis, MN 55435-4803  
Phone: (952) 832-2600  
Fax: (952) 832-2601

# 2010 Wild Rice and Water Quality Monitoring Report

*Second Creek, Spring Mine Creek, Trimble Creek, Unnamed Creek (PM 11), Wyman Creek, Embarrass River, Partridge River, Pike River, and St. Louis River*

## Table of Contents

1.0 Background .....	1
2.0 Wild Rice Survey .....	3
2.1 Wild Rice Survey Methodology .....	3
2.1.1 Methodology of Literature Review for Wild Rice in Downstream Receiving Waters from the Project .....	3
2.1.2 Methodology of Ground Verification and Density/Acreage Calculations.....	4
2.2 Wild Rice Survey Results .....	4
2.2.1 Results of 2009 and 2010 Literature Review.....	4
2.2.2 Results of Ground Verification and Density/Acreage Calculations.....	6
2.3 Plant Density and Seed Calculations Results.....	10
2.4 Wild Rice Survey Discussion .....	11
3.0 Water Quality Monitoring .....	13
3.1 Concentrations of Major Cations and Anions.....	13
3.2 Additional Water Quality Monitoring Activities.....	17
References.....	18

## List of Tables

Table 1	Wild Rice Density Scale.....	4
Table 2	Concentrations of Major Cations and Anions In the Embarrass River Watershed .....	14
Table 3	Concentrations of Major Cations and Anions In the Partridge River.....	15
Table 4	Concentrations of Major Cations and Anions In the Pike River Watershed.....	16
Table 5	Concentrations of Major Cations and Anions In the St. Louis River and St. Louis River Estuary.....	16

## List of Figures

Figure 1a	Extents of 2010 Wild Rice Surveys in the Embarrass River, Partridge River and Pike River Watersheds	
Figure 1b	Extends of 2010 Wild Rice Surveys on the St. Louis River and St. Louis River Estuary	
Figure 2	Ground Wild Rice Survey Results for Hay Lake (MNID 69435) & the Upper Embarrass River Surveyed Aug 12 & 27 and Sept 9, 2010	
Figure 3	Ground Wild Rice Survey Results for Wynne and Embarrass Lakes (Embarrass River) Surveyed August 19, 2010	
Figure 4	Ground Wild Rice Survey Results for Lower Embarrass Lake, Unnamed Lake, and Cedar Island Lake (Embarrass River) Surveyed August 18-19, 2010	
Figure 5	Ground Wild Rice Survey Results for Esquagama Lake, Fourth Lake and Lower Embarrass River (Embarrass River) Surveyed August 20 & September 1, 2010	
Figure 6	Ground Wild Rice Survey Results for Upper Partridge River Surveyed August 25, 2010	
Figure 7	Ground Wild Rice Survey Results for Colby Lake, Lower Partridge River and Upper St. Louis River Surveyed July 26 & 28 and August 20 & 25-26, 2010	
Figure 8	Ground Wild Rice Survey Results for St. Louis River from its Confluence with the Partridge River to the St. Louis River Estuary Surveyed July & August, 2010	
Figure 9	Ground Wild Rice Survey Results for Pokegama Bay and Lower St. Louis River Surveyed August 16-17, 2010	
Figure 10	Ground Wild Rice Survey Results for Hay Lake (MN ID 69579), Little Rice Lake (MN ID 69578) and Pike River Surveyed August 31, 2010	
Figure 11	Ground Wild Rice Survey Results for Spring Mine Creek, Unnamed Creek (PM11), Trimble Creek and Wyman Creek Surveyed August 12 & 27 and Sept 9, 2010	
Figure 12	Ground Wild Rice Survey Results for Second Creek Surveyed, 2010	
Figure 13	Grid Density Calculations, Lower Embarrass Lake (Embarrass River)	
Figure 14	Grid Density Calculations, Unnamed Lake (Embarrass River)	
Figure 15	Grid Density Calculations, Cedar Island Lake (Embarrass River)	
Figure 16	Grid Density Calculations, Lower Partridge River	

- Figure 17 Grid Density Calculations, Pokegama Bay (St. Louis River)
- Figure 18 Grid Density Calculations, Little Rice Lake (Pike River)
- Figure 19 Mean, Median and Standard Deviation of Total Calculated Plant Weight (g) in the Study Area
- Figure 20 Mean, Median and Standard Deviation of Root Weight (g) in the Study Area
- Figure 21 Mean, Median and Standard Deviation of Shoot Weight (g) in the Study Area
- Figure 22 Mean, Median and Standard Deviation of Seed Weight (g) in the Study Area
- Figure 23 Mean, Median and Standard Deviation of Seed Number in the Study Area
- Figure 24 Water Samples Collected in Partridge River, Embarrass River, and Upper St. Louis River
- Figure 25 Water Samples Collected in St. Louis River Estuary
- Figure 26 Sulfate Concentrations in Partridge River, Embarrass River, and Upper St. Louis River
- Figure 27 Sulfate Concentrations in St. Louis River Estuary

### **List of Appendices**

- Appendix A Photographs of Wild Rice in the Project Study Area
- Appendix B Wild Rice Grid Density Calculations for the Project Study Area  
 B-1 Cedar Island Lake (Embarrass River)  
 B-2 Unnamed Lake (Embarrass River)  
 B-3 Lower Partridge River  
 B-4 Pokegama Bay (St. Louis River)  
 B-5 Little Rice Lake (Pike River)
- Appendix C 2010 Wild Rice Management Workgroup’s “350 Significant Wild Rice Waters in Minnesota”
- Appendix D Plant Data (Total, root, and seed biomass, seed number)
- Appendix E 2009 Ground Wild Rice Survey Results (Figures 6 – 21)

# 1.0 Background

---

The purpose of this report is to provide information in response to the Minnesota Pollution Control Agency's (MPCA) "Wild Rice Information Request" on May 28, 2009 with regard to the PolyMet Mining, Inc. (PolyMet) NorthMet Project (Project) (Appendix C).

The MPCA requested the following information:

- 1.0 A literature review to determine the location of wild rice potentially affected by water bodies downstream from the Project. (As a result of this literature review, an analysis of historic infra-red USGS photographs for the presence of wild rice in water bodies downstream from the Project was determined to be beneficial.)
- 2.0 Consultation with Bands of Chippewa and the 1854 Treaty Authority.
- 3.0 A ground survey of wild rice presence and density.
- 4.0 Information on current sulfate concentrations in the bodies of water where wild rice was identified.

As part of consultation with the Bands of Chippewa (Bands) in 2009, PolyMet contacted representatives from Bois Forte Band of Chippewa, Fond du Lac Band of Lake Superior Chippewa, Grand Portage Band of Lake Superior Chippewa, and the 1854 Treaty Authority. Following the literature review and prior to the ground survey, each representative was contacted by email and phone for comment regarding potential water bodies affected by the Project. Representatives from these bands and the 1854 Treaty Authority provided feedback in 2009. Water bodies that were not sampled in 2009, but which were thought to be potential discharge waters downstream from the Project, were sampled in 2010. These included the portion of the Partridge River from Highway 110 to its confluence with the St. Louis River, the entire reach of the St. Louis River from its confluence with the Partridge River to the St. Louis Estuary. A portion of Second (aka Knox Creek) Creek (south of the northern portion of Area 5) was sampled as part of the *2009 Wild Rice Survey and Sulfate Monitoring Report* prepared for Mesabi Nugget Phase II Project. Spring Mine Creek was first sampled as part of the surveys carried out on the Embarrass River in 2009. The remaining portion of Second Creek and Spring Mine Creek were sampled in 2010 as part of the Consent Decree dated April 6, 2010 between the MPCA and Cliffs Erie L.L.C. (CE). Other water bodies sampled as part of the Consent Decree include Unnamed Creek (PM 11), Trimble Creek and Wyman Creek.

This report comprises a second season of data covering items 3.0 and 4.0. No additional consultation with Bands of Chippewa and the 1854 Treaty Authority was carried out in 2010. This report does not include analysis of historic infra-red USGS or Fly-Over photographs. Based on the results from 2009, the analysis of these photographs and the Fly-Over did not provide accurate information regarding the presence or density of wild rice.

This report includes several additional activities not carried out in 2009, including plant collection, analysis of plant growth parameters in the laboratory, and analysis of additional water quality parameters, including major cations ( $Mg^{2+}$ ,  $Ca^{2+}$ ,  $K^+$ , and  $Na^+$ ) and major anions ( $HCO_3^-$  and  $Cl^-$ ). These activities were discussed with the MPCA as useful additions to the original request, but were not communicated formally by letter or email. PolyMet chose to comply with those requests.

## 2.0 Wild Rice Survey

---

The purpose of the Wild Rice Survey is to determine the presence, stand density, and measurements of some plant growth data of wild rice (*Zizania palustris L*, known as *Manoomin* in Ojibwe), an annual grass, on Second, Spring Mine, Unnamed (PM 11), Trimble, and Wyman Creeks, the Embarrass River from its headwaters to its confluence with the St. Louis River, the Partridge River from its headwaters to its confluence with the St. Louis River, the St. Louis River from its confluence with the Partridge to the St. Louis Estuary, and Hay Lake (MN ID 69579) and Little Rice Lake (MN ID 69578) near the Pike River (Study Area) (Figures 1a and 1b). Because wild rice populations oscillate over an approximate 4- to 6- year period, the following analyses and ground surveys were performed to determine the presence of wild rice and some basic plant and water quality parameters in waters where wild rice has been identified in the Study Area:

1. On-the-ground verification of the presence and density of select wild rice stands.
2. Plant survey collection from each grid and from some select locations. Measurement and basic statistical analyses of plant growth parameters including: total plant biomass, root biomass, seed biomass and seed number.
3. In addition to sulfate ( $\text{SO}_4^{2-}$ ), analysis of water samples, collected in or next to wild rice stands, for major cations ( $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$ , and  $\text{Na}^+$ ) and major anions ( $\text{HCO}_3^-$  and  $\text{Cl}^-$ ).

### 2.1 Wild Rice Survey Methodology

The following section describes the methodologies used in obtaining information and data on wild rice.

#### 2.1.1 Methodology of Literature Review for Wild Rice in Downstream Receiving Waters from the Project

To determine which water bodies downstream of the Project might potentially have wild rice, a literature review of historic and cultural information was conducted in 2009 and 2010. Information examined includes the 2008 MDNR “Natural Wild Rice in Minnesota” Report, U.S. Department of Interior Geological Survey maps (Topographic maps), J. William Trygg maps, personal communication with the 1854 Treaty Authority, and the 2010 Wild Rice Management Workgroup’s “350 Significant Wild Rice Waters in Minnesota.” The Wild Rice Management Workgroup is a

coalition of federal, state, tribal resource managers and other wild rice stakeholders. The list is periodically updated and was last updated May 4, 2010 (Appendix B).

### 2.1.2 Methodology of Ground Verification and Density/Acreage Calculations

Surveys to estimate wild rice density and crop acreage were carried out in July, August, and September 2010. The same methods described in the “2009 Wild Rice Survey and Sulfate Monitoring” report for PolyMet were followed in 2010. Table 1 provides information regarding the wild rice density classification and percent coverage.

**Table 1 Wild Rice Density Scale**

<b>Wild Rice Density Classification</b>	<b>Description</b>
1	<10% Wild Rice Coverage
2	10 – 25 % Wild Rive Coverage
3	25 – 50 % Wild Rice Coverage
4	50 – 75% Wild Rice Coverage
5	>75% Wild Rice Coverage

## 2.2 Wild Rice Survey Results

The following sections present the results of the wild rice literature review and survey for the Study Area in 2010. Ground surveys along the St. Louis River were carried out from July 26 – 30, 2010 and from August 24-27, 2010. Wyman Creek was surveyed August 12, 2010. The Embarrass River and Chain of Lakes including the two Hay Lakes and Little Rice Lake were surveyed from August 11 to September 1, 2010. A ground survey of Second Creek downstream of location B was carried out in mid-September 2009 and upstream of location B on September 9, 2010. Spring Mine Creek, Trimble Creek, and PM 11 were surveyed September 9, 2010.

### 2.2.1 Results of 2009 and 2010 Literature Review

Below is an examination of the literature regarding the potential presence of wild rice along the St. Louis River and one of its tributaries, the Embarrass River, both identified as being part of the Study Area. This review supplements the reviews carried out in 2009. According to Minnesota Rules Chapter 7050.0470, sections of the St Louis River upstream of the Study Area are classified as wild rice waters. While no wild rice was identified within the Study Area from historic information, ground surveys were carried out in 2009 and 2010 in order to determine from ground reconnaissance whether rice was present.

- Section 2.0, page 3 of the “2009 Wild Rice Survey and Sulfate Monitoring” report prepared for Mesabi Nugget provides determination of the Study Area as a result of consultation with Bois Forte Band of Chippewa, Fond du Lac Band of Lake Superior Chippewa, Grand Portage Band of Lake Superior Chippewa, and the 1854 Treaty Authority (Barr, 2009).

“... Feedback was received from 1854 Authority’s Darren Vogt on July 10, 2009 confirming that Mesabi Nugget proposed study area included water bodies with potential for the presence of wild rice stands. Mr. Vogt mentioned the St. Louis River, including several sites upstream from its confluence with the Partridge River. After a follow-up phone call, Mr. Vogt agreed that those sites were outside the scope of waters potentially affected by discharge waters. Mr. Vogt also sent Mesabi Nugget a picture of wild rice stands near Highway 110 on the Partridge River dated July 29, 2009. Three grid density calculations were made in that location. After follow up emails and phone calls to representatives of the three bands, they said that they did not have any additional input beyond what Mr. Vogt provided.”

- The 2010 Wild Rice Management Workgroup’s “350 Significant Wild Rice Waters in Minnesota” identifies several reaches of the headwaters of the St. Louis River as historically supporting wild rice (similar to information provided by Darren Vogt in personal communication above). It does not, however, mention reaches of the river within the Study Area.
- Page 104 of the MDNR *Investigational Report #69: A Biological Survey and Fishery Management plan for the Streams of the Saint Louis River Basin* (Moyle and Kenyon, 1947) includes discussion of the presence of wild rice in two rivers which flow into the St. Louis River. These rivers, however, are not part of the mainstem of the St. Louis River. The report reads: “Historic presence of wild rice in the St. Louis River Basin. #38. Zizania aquatica L., wild rice. – Rare in most of the streams; most common in the western portion of the [St. Louis] drainage basin. The most extensive stands are in the Floodwood and Swan River drainage basins.”
- The MDNR, Section of Fisheries “Completion Report: A Study of the St. Louis River” identified wild rice in three locations along the upper St. Louis River: downstream from Seven Beaver Lake at river miles 187 to 189, 176 and 165. Pages 25 – 27 include narrative description of its presence. Within the Habitat Assessment section, River Mile 188.7 it was noted, “... Wild rice was extensive and extended from the shore to a depth of three to four feet.” At River Mile 171.0 it was noted, “Wild rice beds dominated this reach, with a

deeper channel down the center, but no distinct shoreline.” These locations, however, were not within the Study Area.

- Page 74 of the MDNR *Investigational Report #69: A Biological Survey and Fishery Management plan for the Streams of the Saint Louis River Basin* (Moyle and Kenyon, 1947) includes a discussion of geomorphology and the presence of some chemical, plant and fish species. “Waters of this river system are soft with an average total alkalinity of 37.2 ppm at eight stations, about neutral (pH 6.6 to 7.3), low in sulphates (0.2 ppm), chlorides (0.2 ppm), and moderate phosphorus (T.P. 0.041 ppm) and nitrogen (T.N. 0.185 ppm) fertility.” Wild rice is not identified as part of the list of aquatic plants growing in the Embarrass River.
- Map No. 17, *Composite Map of United States Land Surveyors’ Original Plats and Field Notes* (J. William Trygg, 1966) identifies the “Remains of Indian encampment” north of the Tailings Basin (Figure 1a). In summer 2010, Barr field staff attempted to locate the site via helicopter, but were unsuccessful. The site appears to be generally located on a circular rise located just above a marshy area.

## **2.2.2 Results of Ground Verification and Density/Acreage Calculations**

Wild rice was identified from ground surveys performed on the water bodies identified in 2.2.

(Figures 2 to 18). Water bodies surveyed in 2009 were surveyed again in 2010. The St. Louis River from its confluence with the Partridge River down to the St. Louis Estuary and a portion of Second Creek not surveyed in 2009 were surveyed for the first time in 2010.

### ***Embarrass River***

Qualitatively and generally speaking, 2009 and 2010 were comparable in terms of wild rice density. In general, the following water bodies had patches of wild rice in isolated locations comprising a few stems totaling less than 1 percent of the surveyed acreage (see photographs A-2 and A-10). These water bodies include the upper reach of the Embarrass River, Hay Lake (MN Lake ID 69435; east of the Embarrass River), Sabin Lake, Wynne Lake, Lower Embarrass Lake, Unnamed Lake, Cedar Island Lake, Fourth Lake, Esquagama Lake, and most of the remaining reach of the Embarrass River to its confluence with the St. Louis River. The density factor was variable, but consistently a one or two within these stands, with the exception of some small stands in Cedar Island Lake with density factors of 4 and 5 (Figures 2 to 5 and 13 to 15). A small group of plants were found on Wynne Lake. Embarrass Lake had a few small stands of wild rice along its shoreline, while Unnamed Lake and Cedar Island Lake had the largest populations of wild rice on the Embarrass River system.

Compared to 2009, some portions of Cedar Island Lake were somewhat more dense; others less

dense. Photographs of wild rice in the Study Area in 2010 are included in Appendix A. Detailed information on density calculation results of the ground surveys, including differences between 2009 and 2010 are included in Appendix B. While difficult to navigate, most of the remaining Embarrass River was surveyed (up to County Road 95/ Bodas Road). No rice was observed along the Embarrass south of the outlet of Esquagama Lake to the survey's end point.

In 2010, field staff found a nearly dry Hay Lake (MN Lake ID 69435). Hay Lake is man-made, created by an earthen berm and wooden stop log structure at its outlet. Based on observations in 2010, it appears that the earthen berm eroded in the location where it meets the wooden dam, allowing the lake to drain. Some standing water remains in the middle of the former lake, but much of the former lake was a mudflat. Grasses and other macrophytes were identified growing on the mudflat near the former shoreline of the lake. Scattered wild rice was found growing in the mud and the standing water. In 2009, wild rice was identified in this lake in patches with density factor 1. Hay Lake does not receive flow from the Project, even under flood conditions.

### ***Partridge River***

In general, in 2009, based on qualitative assessments, the upper Partridge River had patches of wild rice in isolated locations comprising a few stems totaling less than 1 percent of the surveyed acreage (density factor less than one) (Appendix E). In 2010, the survey began at the confluence of Longnose Creek (T59 R13 S29) and the Partridge River, and ended at the confluence of the Partridge and St. Louis Rivers (Figures 6 and 7). Due to safety concerns relating to the difficulty navigating the Partridge River, two sections were not surveyed in 2010: 1) the section immediately upstream of Colby Lake and downstream of County Road 565; and 2) the 1 mile long section immediately downstream of Colby Lake. These two sections had limited occurrences of wild rice in 2009. In 2010, no rice was identified until approximately 0.75 miles upstream from County Road 565. It is possible that a very small number of locations where wild rice was identified along the upper Partridge River in 2009 were locations of other plant species that were mis-identified as wild rice. Other macrophytes that are most easily mis-identified as wild rice include *Carex* spp. (sedges) and *Glyceria* spp. (manna grasses). These species were not identified at those locations in 2009. They were, however, identified in some of those locations in 2010. It is also possible that the wild rice populations are small enough in these areas that isolated patches of rice appear some years and not others.

### **Upper Partridge River**

Navigation of the Upper Partridge River, in general, was difficult. Navigation was particularly difficult for the last several miles upstream of Colby Lake. In 2009, one small river stretch, approximately 0.75 miles upstream of County Road 565, was identified in field notes and in discussions with field staff as having patches of dense rice (although identified as having density factor 1). In 2010, that same river stretch was the only area identified as having dense patches of wild rice, with density factors of between one and three (Figure 6).

### **Lower Partridge River**

No rice was identified on Colby Lake. Stands with a density factor of three to five were identified along the Lower Partridge River between Colby Lake and the St. Louis River (Figures 7 and 16). Wild rice stands with densities of between three and five were identified along this stretch (Figure 7).

### ***St. Louis River***

In 2010, wild rice was identified from ground surveys performed on the St. Louis River downstream from its confluence with the Partridge River. The densest stand of wild rice (density factor 2) was identified just upstream from Highway 100, with dimensions of approximately 15 feet x 80 feet (see photograph A-11). The stand was not dense enough to carry out grid sampling. A few sparse stands of wild rice (density factor 1) were identified approximately 500 and 1000 feet downstream of Highway 100 (Figure 7 and photographs A-12 and A-13). Surveys of the St. Louis River upstream of the St. Louis Estuary were not carried out in 2009.

Qualitatively, 2009 and 2010 were comparable in terms of wild rice density in the lower St. Louis River and the St. Louis Estuary. In 2010, sparse stands of wild rice were found along short stretches of the lower St. Louis River near its outlet into Lake Superior in a majority of the same locations as in 2009 (Figures 9 and 17). In 2009, grids were set up in Pokegama Bay, which is in Wisconsin. Grid 91 had an average stem count of 40 stems per 0.5 m<sup>2</sup> and in 2010 it had 9 stems per 0.5 m<sup>2</sup>. In 2009, Grid 92 had an average stem count of 54 stems per 0.5 m<sup>2</sup> and in 2010 it had 38 stems per 0.5 m<sup>2</sup>. In 2009, the average stem count for Grid 90 was 27 per 0.5 m<sup>2</sup> and in 2010 it had 28 stems per 0.5 m<sup>2</sup>. From discussion with Professor Anthony Kern, Northland College, Ashland, WI who carries out research on wild rice in Pokegama Bay, wild rice is present in dense stands and covers a large area most years (personal communication, August 2009).

### ***Hay and Little Rice Lakes, Pike River***

In 2009 and 2010, very little rice was found on Hay Lake (MN Lake ID 69579) near the Pike River, with small stands totaling less than 1 percent of the sampled acreage. Wild rice stands with a density

factor of three to five were identified in the Pike River near Little Rice Lake, and within Little Rice Lake itself (MN Lake ID 69578) (Figures 10 and 18).

### ***Second, Spring Mine, Unnamed (PM 11), Trimble, and Wyman Creeks***

No wild rice was identified along these stream stretches (Figures 11 and 12). Portions of these streams were unnavigable by canoe or kayak and were, therefore, traversed by foot or driven by car to the extent possible. The creek beds were largely characterized by the presence of gravel, cobble, sand, loose sediments, grassy banks, and in places thick overhead canopy. Other macrophytes were identified growing along these stream reaches. Some macrophytes commonly mistaken for wild rice are *Carex* spp. and *Glyceria* spp. *Glyceria grandis*, an American mannagrass and *Carex utriculata*, a common yellow lake sedge or Northwest Territory sedge from other water bodies in the Study Area were positively identified in the laboratory. While no rice was identified on these streams in 2010, nor on the portion of Second Creek surveyed in 2009, field staff thought that conditions were favorable to potentially support wild rice on Second Creek along the lower one half to one third (downstream portion) of the stream reach. Wild rice was identified on the Partridge River at its confluence with Second Creek. It is possible that smaller rice populations are present some years and not others. Based on discussion with Professor Anthony Kern, Northland College, Ashland WI, who carries out research on wild rice in many water bodies in Minnesota, it is possible that infrequent reproduction in these small populations is still sufficient to maintain the seed bank, accounting for the presence of wild rice in some years and not others (personal communication, November 23, 2010).

### **Second Creek**

Portions of Second Creek were unnavigable by canoe or kayak. The streambed comprised a mixture of cobble, sand and fine grain sediments. The area surrounding the channel was flat and grassy with wetlands along portions of the stream populated mostly by *Typha* spp. (cattails). The water had a rusty or orange coloring, particularly from PolyMet base line sampling locations PM 7 to PM 17. Field staff identified approximately ten active and ten inactive beaver dams.

### **Spring Mine Creek**

Most of Spring Mine Creek was unnavigable by canoe or kayak. It was possible to drive alongside it from PM 12 to 09LS101. Field staff determined that it was difficult to identify a good access point south from 09LS101 along the remaining stream reach. Field staff walked from SD033 north along the streambed. The stream channel was between 6 to 12 feet wide with flowing water. The upstream portion (north of 09LS101) cascades through rocks and boulders, and has dense forest canopy. The

downstream portion (south of 09LS101) flows alongside a road, where the streambed is a mix of sand/gravel/silt and the banks are overhanging grass. Field staff identified the following macrophytes *in situ*: *Typha* spp. (cattails), *Scirpus* spp. (bulrushes), *Eupatorium maculatum* (joe pyeweed), *Juncus* spp. (rushes), and *Agrostis* spp. (grasses).

#### **Unnamed Creek (PM 11)**

Approximately one third of a mile downstream from the railroad grade, Unnamed Creek (PM 11) was approximately 8 feet wide and 0.5 feet deep with fairly rapid stream-flow. The remaining portion of stream channel was quite narrow and shallow with over-hanging grass. The streambed comprised boulders, cobble, and silty-sand. The area surrounding the stream channel was a large open wetland dominated by *Typha* spp. (cattails). Field staff identified one active beaver dam.

#### **Trimble Creek**

Trimble Creek was unnavigable by canoe or kayak. Field staff walked the stream channel from County Road 358 to County Road 615. Navigation of this channel on foot was extremely difficult. The substrate was very loose – sandy and fine grain sediments – along portions of this stream. Portions of the stream were full of *Typha* spp. (cattails) and other portions were predominantly overhanging grass. Field staff identified several beaver dams.

#### **Wyman Creek**

Wyman Creek was unnavigable by canoe or kayak. Field staff drove from SD012 to SD030 next to the stream bank. The area surrounding the stream channel and the channel itself were comparable in terms of substrate and geomorphology to Spring Mine Creek.

### **2.3 Plant Density and Seed Calculations Results**

Total plant, shoot, root, and seed weight (dry weight) and total seed number were calculated for plants collected from the Embarrass River (including the chain of lakes), the Pike River, the Partridge River, and the St. Louis River (Figures 19 to 23). Mean, median and standard deviation of each parameter was also calculated. Total plant biomass was compared to total sum of roots, shoots, and seed biomass (Appendix D). Mean total calculated plant weight in the four river systems ranged from 1.74 g in the Embarrass River (lowest) to 4.77 g in the Partridge River (highest). Mean root weight ranged from 0.14 and 0.42 g and mean shoot weight ranged from 1.57 and 4.12 g in the Embarrass and Partridge Rivers respectively. Mean seed weight was 0.13 and 0.26 g in the Embarrass and Pike Rivers respectively. Mean seed number ranged from 20 to 63.26 in the Embarrass and St. Louis Rivers respectively. Standard deviations, however, were very large for each

parameter in each water body. If future sampling is carried out, a larger plant sample may assist in reducing the standard deviation.

## 2.4 Wild Rice Survey Discussion

Results from 2010 ground surveys identified the presence of wild rice in many of the same locations where wild rice was identified in 2009. As in 2009, denser stands of wild rice (density factor  $\geq 3$ ) were identified on Cedar Island Lake, the Lower Partridge River, Little Rice Lake, and Pokegama Bay in the Louis River Estuary. Wild rice was newly identified in 2010 on the St. Louis River near its confluence with the Partridge River. Results from 2010 ground surveys identified the presence of wild rice in three locations on the St. Louis River within several thousand feet of its confluence with the Partridge River. Wild rice beds in the St. Louis River upstream of the Partridge River confluence had density factor two (10 to 25%). Wild rice beds downstream of the Partridge River confluence were small and sparse, having density factor 1 (less than 10%). Wild rice was not found along the remaining reach of the St. Louis River (up to Fond du Lac Dam). No new grids were set up in 2010. Wild rice was not identified on Spring Mine, Second, Unnamed (PM 11), Trimble, or Wyman Creeks.

Four areas had fairly dense stands of wild rice: Cedar Island Lake, in the Embarrass River watershed; Pokegama Bay, in the St. Louis River watershed; Little Rice Lake (MN ID 69578), in the Pike River watershed; and the Lower Partridge River. A comparison of measured wild rice densities for all grid locations is presented in Figures 13 to 18, and sulfate data collected as part of this study is presented in Section 3.0 below. Cedar Island Lake had densities between 60 and 60.2 stems / 0.5 m<sup>2</sup> with sulfate levels ranging from 23.4 mg/L to 23.9 mg/L. Pokegama Bay had densities between 8.7 to 37.6 stems / 0.5 m<sup>2</sup> with sulfate levels ranging from 2.22 mg/L to 2.44 mg/L. Little Rice Lake had densities between 34.7 to 115 stems / 0.5 m<sup>2</sup> and sulfate levels ranged from 2.22 mg/L to 2.44 mg/L. The Lower Partridge River downstream from Colby Lake had fairly dense stands between 36.5 and 46.5 stems / 0.5 m<sup>2</sup> and sulfate levels ranged from 48.0 mg/L to 161 mg/L (see Section 3.0).

It is difficult to determine the health and history of wild rice in these water bodies without a multi-year combined analysis of ground surveys as wild rice populations oscillate over an approximate 4- to 6- year period. Delays in plant nutrient uptake and wild rice tissue chemistry influence wild rice growth and production from year to year (Walker et al., 2006; Walker et al., 2010). Other factors such as water level, parasites, herbivory, and weather conditions may also play a role, but no data has been collected over multiple years and published. Given that wild rice populations fluctuate over a multiple year time period, studies carried out over a shorter time period (one year) may not

provide sufficient data to begin to determine the factors affecting the growth and production of wild rice. Studies carried out over too short a time period also make it difficult to determine the relative importance of sulfate compared to other factors on wild rice growth and production.

Additional monitoring data (not limited to sulfate concentrations and wild rice density) would be needed in order to begin assessing the effects of sulfate on wild rice growth and production. Such monitoring data should include analysis of other water and sediment anion and cation concentrations, plant nutrient content to name several of the most commonly measured. Such data is also important in order to determine the effects of sulfate relative to other factors on the growth and production of wild rice. Section 3.0 comprises analysis of major water anion and cation concentrations from samples collected near wild rice populations.

## 3.0 Water Quality Monitoring

---

Water quality samples were collected during the wild rice surveying in August and September of 2010. Results of analyses of major cations and anions, including sulfate concentrations, are presented in this section.

### 3.1 Concentrations of Major Cations and Anions

Results of sulfate analyses performed on water samples collected during wild rice surveys of 2010 are shown on Figures 24 to 27. All water samples were analyzed for sulfate using an ion chromatography method (EPA 300.0). A total of 28 water samples were collected from the various water bodies. Observed sulfate concentrations ranged from a minimum of < 1 mg/L (Hay Lake, off of the Pike River) to a maximum of 411 mg/L (Partridge River).

Sulfate concentrations observed in the Embarrass River watershed during the 2010 wild rice survey ranged from 7.86 mg/L to 43.4 mg/L. Concentrations of sulfate and other major cations and anions in the Embarrass River are presented in Table 2.

**Table 2 Concentrations of Major Cations and Anions In the Embarrass River Watershed**

Sample ID	Sample Date	Sulfate (mg/L)	Alkalinity, bicarbonate (mg/L CaCO <sub>3</sub> )	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
PM-EMB-CDF-04	8/12/10	43.4	--	--	--	--	--	--
PM/CL-LEM-LAD-01	8/17/10	22.8	77.5	5.93	20.9	12.8	2.08	9.49
PM/CL-CIL-LAD-01	8/18/10	23.9	71.6	5.59	21.3	12.9	2.38	9.17
PM/CL-CIL-LAD-02	8/18/10	23.4	74.0	5.61	20.2	12.3	2.13	9.25
Cedar Island L. 1 SW	8/18/10	24	77	5.8	19	7.3	<1	5.9
Cedar Island L. 2 SW	8/18/10	24	80	5.8	18	12	1.8	8.9
Unnamed L. SW	8/18/10	23	75	5.6	18	12	1.7	8.9
PM/CL-UNL-LAD-01	8/19/10	23.4	71.5	5.4	19.7	12.2	2.08	9.08
PM-WYN-KDM-01	8/19/10	16.3	65.6	4.34	17.4	11.0	1.63	8.12
PM-EMB-NGP-01	8/20/10	23.2	71.3	5.32	19.5	12.2	1.89	8.96
PM-ESQ-NGP-01	8/20/10	26.6	72.0	5.82	19.7	12.2	1.99	8.77
PM-ESQ-NGP-02	8/20/10	27.1	72.7	5.99	19.9	12.5	2.02	8.97
CC-EMB-NGP-02	8/20/10	23.2	71.0	5.39	19.2	12.0	1.85	8.87
PM-EMR-KDM-01	8/27/10	7.86	86.1	4.06	21.9	12.1	2.14	7.29
CLF-EMB-CMH2-01	9/1/10	36.6	116	7.06	27.0	20.4	3.64	14.4
Minimum	--	7.86	65.6	4.06	17.4	7.3	1.63	5.9
Maximum	--	43.4	116	7.06	27	20.4	3.64	14.4

Sulfate concentrations observed in the Partridge River during the 2010 wild rice survey ranged from 21.3 mg/L to 411 mg/L. Concentrations of sulfate and other major cations and anions in the Partridge River are presented in Table 3. Concentrations of sulfate in the Partridge River increase at the confluence with Second Creek due to the higher concentrations of sulfate in Second Creek.

**Table 3 Concentrations of Major Cations and Anions In the Partridge River**

Sample ID	Sample Date	Sulfate (mg/L)	Alkalinity, bicarbonate (mg/L CaCO <sub>3</sub> )	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
PM-PAR-KDM-01	7/26/2010	411	--	--	--	--	--	--
PM-PAR-KDM-02	7/26/2010	335	--	--	--	--	--	--
PM-PAR-KDM-03	7/26/2010	378	--	--	--	--	--	--
PAR UP SW	8/18/2010	53	63	6.9	28	11	1.4	7.3
PAR DWN SW	8/18/2010	160	97	6.9	31	42	1.4	12
PM-COL-NGP-01	8/20/2010	37	57.5	8.45	24.9	10.1	1.71	8.52
PM-COL-NGP-02	8/20/2010	42.2	54.8	7.16	26.1	10.1	1.59	7.71
PM-PAR-KDM-04	8/24/2010	48	--	--	--	--	--	--
PM-PAR-KDM-05	8/24/2010	126	--	--	--	--	--	--
PM-PAR-KDM-06	8/24/2010	161	--	--	--	--	--	--
PM-PAR-KDM-08	8/26/2010	21.3	99.9	24.6	28.3	14.4	3.46	19.3
Minimum	--	21.3	54.8	6.9	24.9	10.1	1.4	7.3
Maximum	--	411	99.9	24.6	31	42	3.46	19.3

Sulfate concentrations observed in the Pike River watershed (including Hay Lake and Little Rice Lake) during the 2010 wild rice survey ranged from < 1 mg/L to 2.44 mg/L. Concentrations of sulfate and other major cations and anions in the Pike River watershed are presented in Table 4.

**Table 4 Concentrations of Major Cations and Anions In the Pike River Watershed**

Sample ID	Sample Date	Sulfate (mg/L)	Alkalinity, bicarbonate (mg/L CaCO <sub>3</sub> )	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
PM/CL-PIKE-KJN-01	8/16/10	2.22	76.3	9.49	23.5	8.48	0.38	7.0
PM/CL-RL-KJN-01	8/16/10	2.44	39.0	4.86	13.9	4.92	0.30	3.98
PM/CL-RL-LAD-01	8/17/10	2.37	77.1	9.65	23.6	8.56	0.41	7.13
Pike R. SW	8/18/10	2.4	79	9.7	23	8.7	< 1	7.2
Little Rice L. SW	8/18/10	2.3	70	8.2	19	7.3	< 1	5.9
POL-HAY-CMH2-01	8/31/10	< 1	17.9	< 0.5	5.95	1.79	0.26	< 2
Minimum	--	< 1	17.9	< 0.5	5.95	1.79	0.26	< 2
Maximum	--	2.44	79	9.7	23.6	8.7	0.41	7.2

Sulfate concentrations observed in the St. Louis River and St. Louis River estuary (including Pokegama Bay) during the 2010 wild rice survey ranged from 2.22 mg/L to 2.44 mg/L.

Concentrations of sulfate and other major cations and anions in the estuary are presented in Table 5.

**Table 5 Concentrations of Major Cations and Anions In the St. Louis River and St. Louis River Estuary**

Sample ID	Sample Date	Sulfate (mg/L)	Alkalinity, bicarbonate (mg/L CaCO <sub>3</sub> )	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
PM-POK-MRB2-00	8/16/2010	2.22	76.7	3.57	25.3	9.04	3.29	4.49
PM-POK-MRB2-01	8/17/2010	2.25	74.6	3.69	26.5	10.3	4.03	4.51
PM-POK-MRB2-02	8/17/2010	2.44	76.4	3.98	26.1	9.65	3.54	4.57
Minimum	--	2.22	74.6	3.57	25.3	9.04	3.29	4.49
Maximum	--	2.44	76.7	3.98	26.5	10.3	4.03	4.57

### **3.2 Additional Water Quality Monitoring Activities**

Additional water quality monitoring activities were conducted at multiple locations in 2010 for other environmental studies for the Project. Water quality data, including sulfate concentrations, were measured in the Embarrass River, the Partridge River, and Pokegama Bay. This additional water quality data is included in Appendix F. Sulfate concentrations observed during these additional monitoring activities are summarized below.

Sulfate concentrations were measured in water samples collected from the Partridge River upstream of Colby Lake at monitoring locations SW-003, SW-004, SW-004a, SW-004b, and SW-005 in 2010. Sulfate concentrations ranged from 4.6 mg/L to 24.0 mg/L in the Partridge River upstream of Colby Lake.

Sulfate concentrations were measured in the Embarrass River and associated lakes at monitoring locations PM-12, PM-12.1, PM-12.2, PM-12.3, PM-12.4, PM-13, PM-19, PM-21, PM-22, PM-23, PM-24, EL-1, and EL-2. Sulfate concentrations ranged from < 1 mg/L to 348 mg/L. In general, the lowest concentrations of sulfate were observed at PM-12 upstream of the Spring Mine Creek confluence. The highest concentrations of sulfate were observed at PM-12.1 downstream of the confluence with Spring Mine Creek, which has elevated concentrations of sulfate.

Sulfate concentrations were measured in Pokegama Bay at three locations: PB-1, PB-2, and PB-3. Sulfate concentrations ranged from 2.94 to 10.6 mg/L.

## References

---

1854 Treaty Authority (2008) Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998 - 2008)

Barr. 2008. *RS74A Surface Water and Groundwater Quality Modeling: Mine Site*. Draft 02.

Minnesota Department of Natural Resources. 2008. *Natural Wild Rice In Minnesota: A Wild Rice Study* document submitted to the Minnesota Legislature by the Minnesota Department of Natural Resources February 15, 2008.

Minnesota Department of Natural Resources. 1947. *Investigational Report #69: A Biological Survey and Fishery Management plan for the Streams of the Saint Louis River Basin* (Moyle and Kenyon, 1947).

Minnesota Department of Natural Resources. 2006. *Section of Fisheries: Completion Report: A Study of the St. Louis River* (Lindgren et al. 2006).

*Personal Communication, November 23, 2010, with Dr. Anthony Kern, Northland College, Ashland, WI.*

Trygg, J. William. *Composite Maps of United States Land Surveyors' Original Plats and Field Notes* (Trygg, 1966) <http://www.trygglandoffice.com/maps.html>.

Walker, R.D., Pastor, J., Dewey, B.W. 2006. "Effects of wild rice (*Zizania Palustris L.*) straw on biomass and seed production in northern Minnesota." *Canadian Journal of Botany*, 84, (1): 1019-1024.

Walker, R.D., Pastor, J., Dewey, B.W. Submitted for publication 2010. "Litter Quantity and Nitrogen Immobilization Cause Oscillations in Productivity of Wild Rice (*Zizania palustris L.*) in Northern Minnesota." *Ecosystems*, 13: 485-498.

## Tables

**Table 1 Sulfate and Water Depth Data at Wild Rice Stands in PolyMet NorthMet Project Study Area, 2009**

Waterbody	# Samples	Sulfate Concentration (mg/L)			Water Depth (in)
		Mean	Std. Dev.	Range	Mean
Cedar Island Lake	7	19.8	0.3	19.3 - 20.3	22
Embarrass Lake	5	21.3	0.1	21.2 - 21.4	34
Embarrass River	2	27.3	--	21.2 - 33.3	12
Esquagama Lake	1	17.1	--	--	28
Fourth Lake	1	18.9	--	--	--
Hay Lake (east of Embarrass)	3	1.6	0.1	1.5 - 1.8	4
Hay Lake (off Pike River)	3	1.1	0.02	1.1 - 1.1	32
Little Rice Lake	6	2.1	0.2	1.9 - 2.3	30
Lower Embarrass Lake	2	21.3	--	21.2 - 21.4	21
Pokegama Bay	4	7.6	0.8	7.0 - 8.8	23
St. Louis River	6	17.7	7.4	8.0 - 27.4	15
Unnamed Lake	3	21.1	0.2	20.9 - 21.3	19
Upper Partridge River	14	5.0	0.3	4.6 - 5.7	12

**Table 2 Baseline Sulfate Data for Partridge and Embarrass Rivers (from RS74A)**

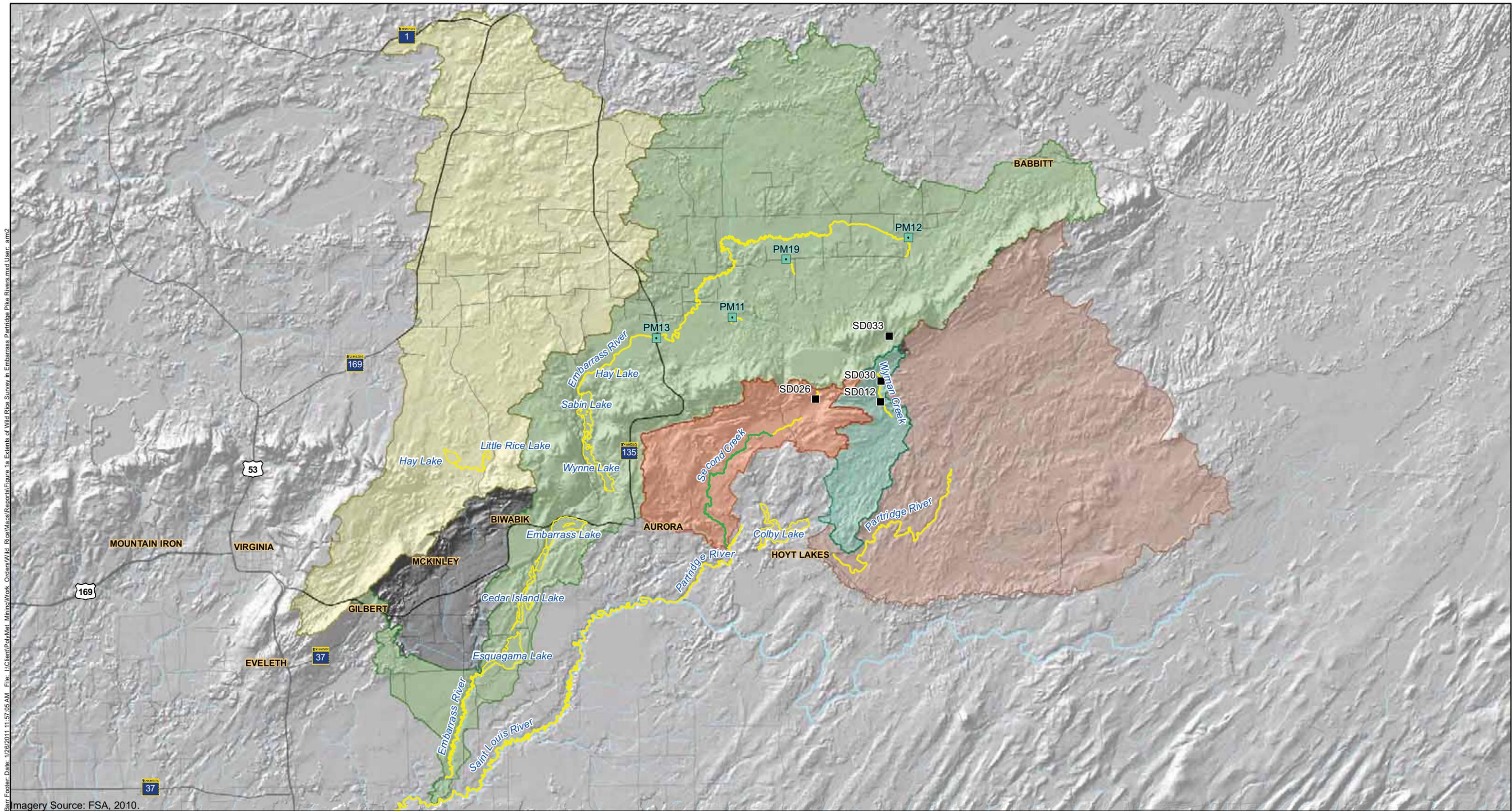
<b>Location</b>	<b>River</b>	<b>Average (mg/L)</b>	<b>Std. Dev. (mg/L)</b>	<b>Min. (mg/L)</b>	<b>Max. (mg/L)</b>
SW-001	Partridge	22.1	2.2	19.3	26.1
SW-002	Partridge	6.3	4.7	0.1	11.8
SW-003	Partridge	10.9	7.0	0.4	25.7
SW-004	Partridge	10.0	5.4	0.5 <sup>1</sup>	22.0
SW-005	Partridge	9.0	5.4	0.5 <sup>1</sup>	20.0
PM-12	Embarrass	4.6 <sup>2</sup>	4.3	0.5 <sup>1</sup>	18.2 <sup>2</sup>
PM-13	Embarrass	36.1 <sup>3</sup>	27.4	10.3	106.0 <sup>3</sup>

<sup>1</sup> Non-detect, value is half the detection limit

<sup>2</sup> Excludes outlier of 116 mg/L

<sup>3</sup> Excludes outlier of 688 mg/L

## Figures



File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Figure\_1a\_Extents\_of\_Wild\_Rice\_Survey\_in\_Embarrass\_Partridge\_Pike\_Rivers.mxd User: am2  
 Date: 1/26/2011 11:57:05 AM  
 Imagery Source: FSA, 2010.

- Surface Water Monitoring Locations
- Existing Surface Discharges
- Stream Segments Surveyed in 2010
- Embarrass River Watershed
- Partridge River Watershed
- Second Creek Watershed
- Wyman Creek Watershed
- Pike River Watershed

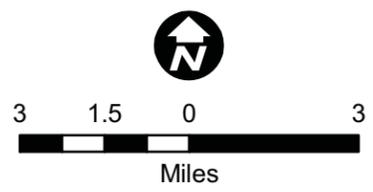


Figure 1a  
 EXTENTS OF 2010 WILD RICE SURVEYS IN  
 THE EMBARRASS RIVER, PARTRIDGE RIVER  
 AND PIKE RIVER WATERSHEDS  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



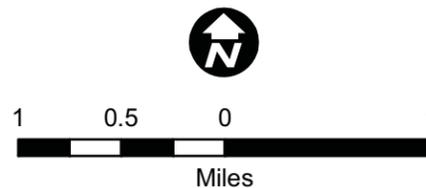
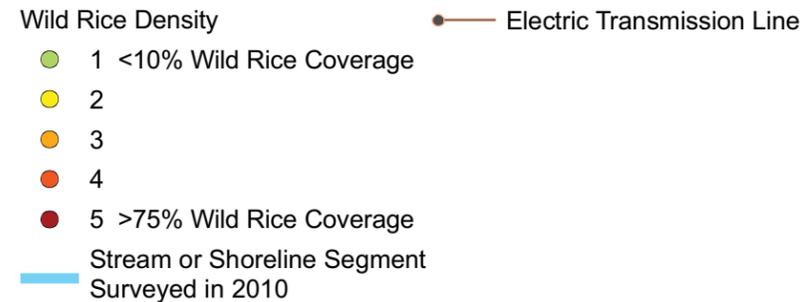
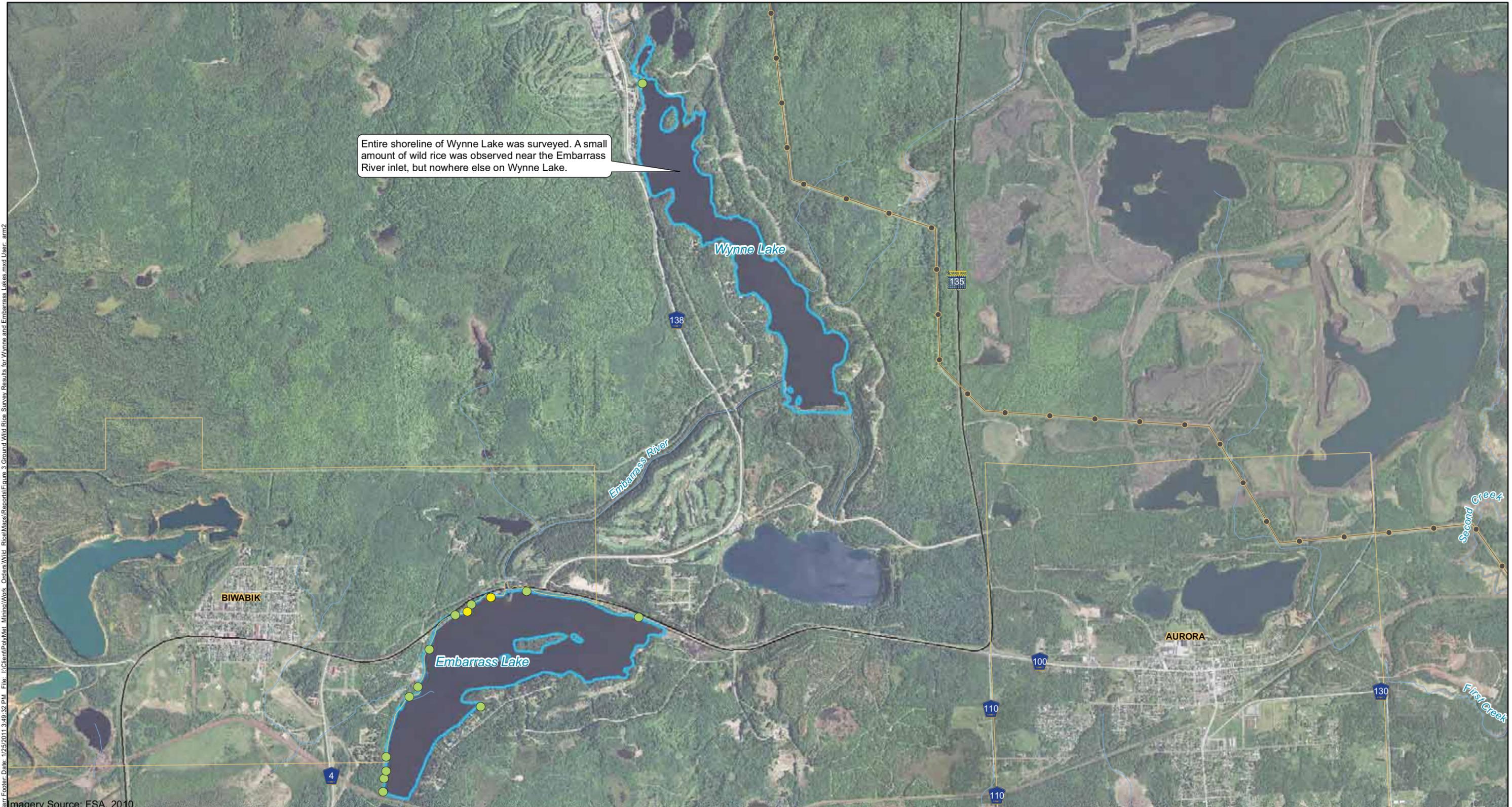


Figure 2  
 GROUND WILD RICE SURVEY RESULTS FOR HAY LAKE  
 (MNID 69435) & THE UPPER EMBARRASS RIVER  
 Surveyed Aug 12 & 27 and Sept 9, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Path: Footer Date: 1/25/2011 3:49:32 PM File: I:\Client\Polymet\Minna\Work Orders\Wild\_Rice\Mapa\Reports\Figure 3 Ground Wild Rice Survey Results for Wynne and Embarrass Lakes.mxd User: am2



- Wild Rice Density
- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Shoreline Segment Surveyed in 2010

- City Boundaries
- Electric Transmission Line
- Rivers and Streams

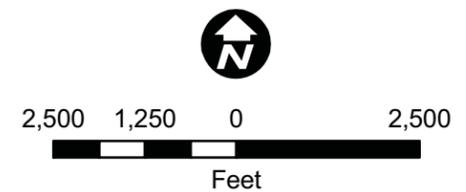
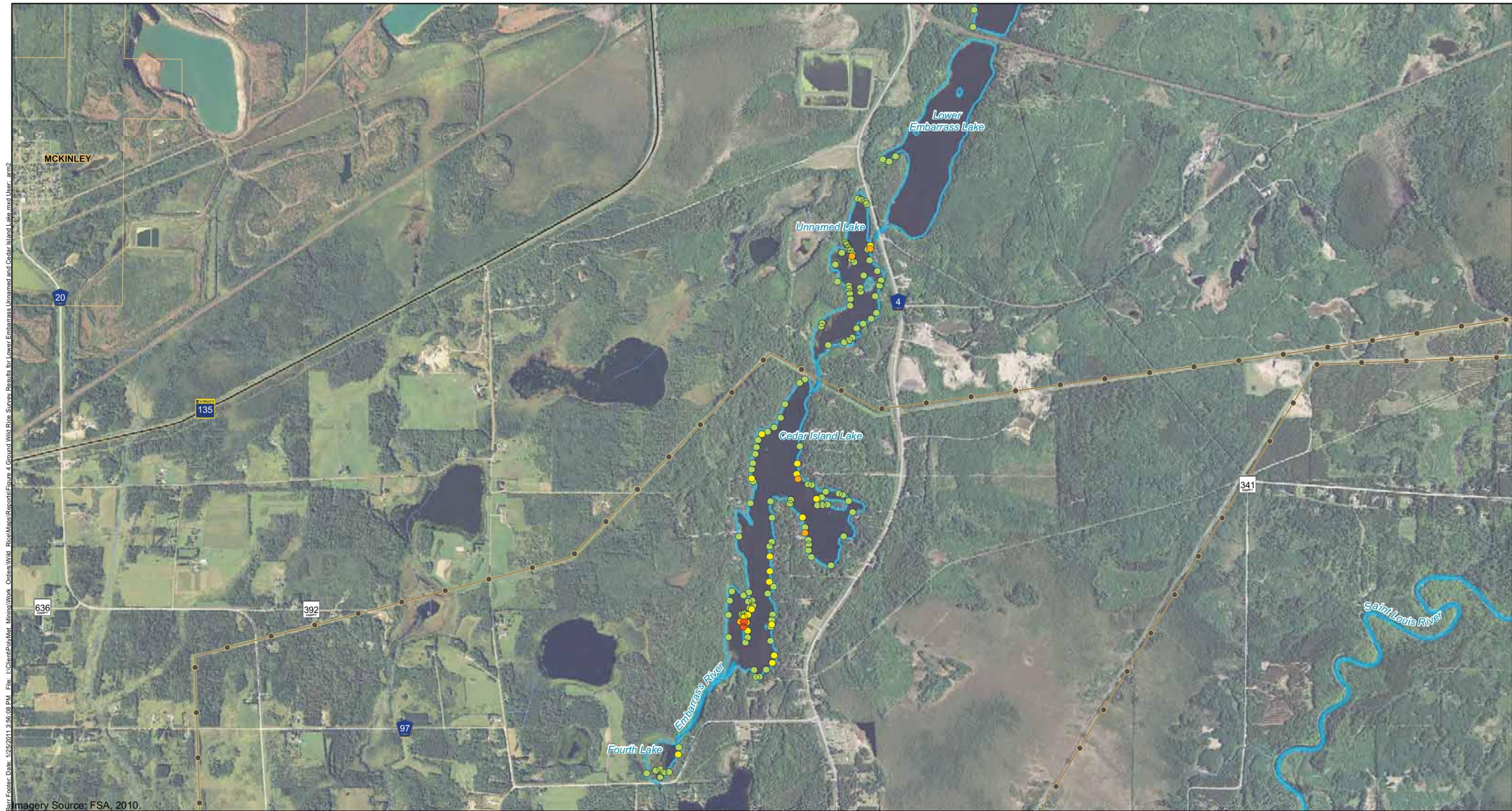


Figure 3  
GROUND WILD RICE SURVEY RESULTS FOR  
WYNNE & EMBARRASS LAKES (EMBARRASS RIVER)  
Surveyed August 19, 2010  
NorthMet Project  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota



- Wild Rice Density
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage
- Stream or Shoreline Segments Surveyed in 2010
- Electric Transmission Line
  - Rivers and Streams
  - City Boundaries

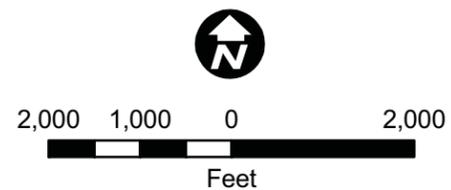
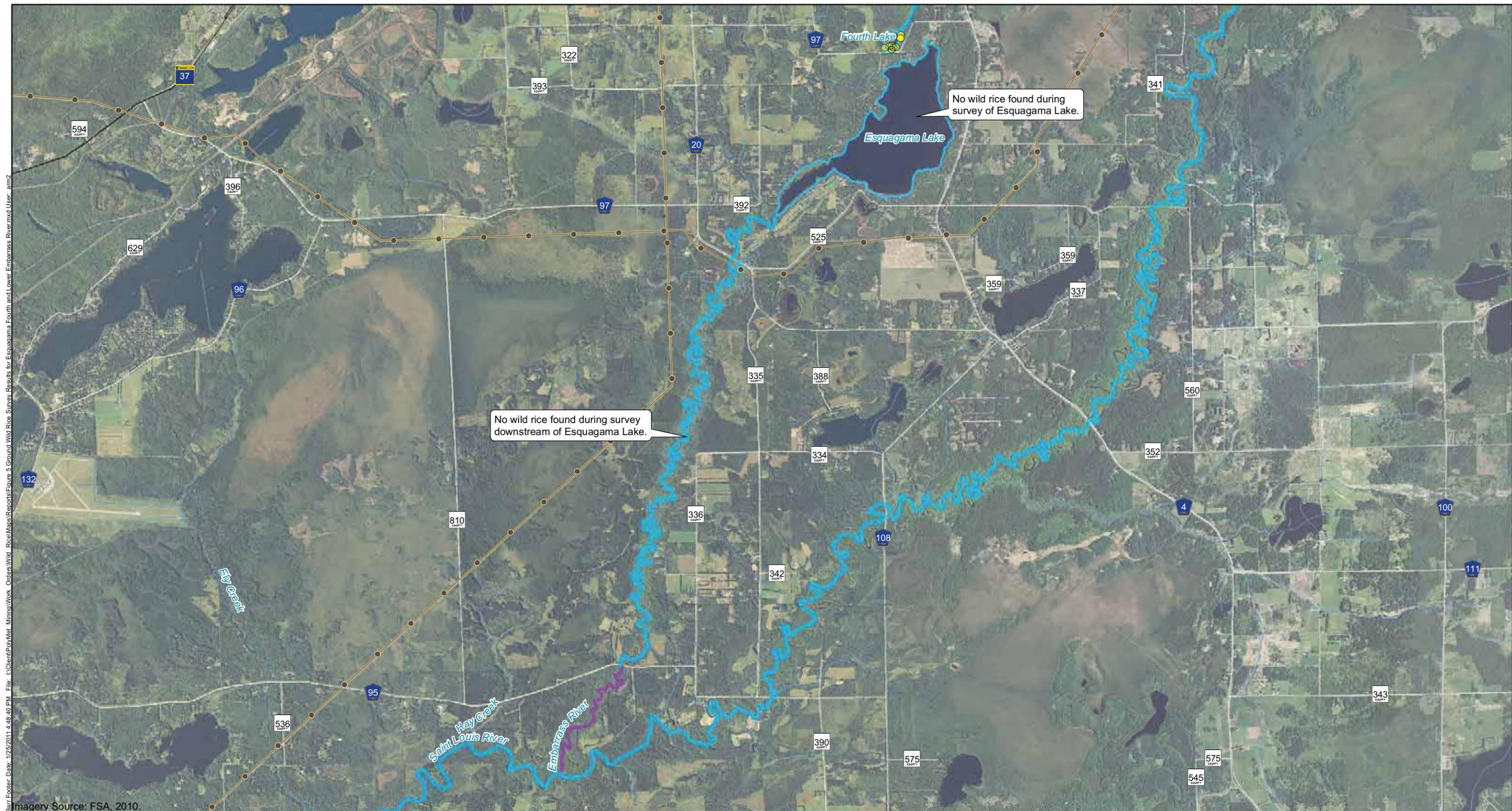


Figure 4  
 GROUND WILD RICE SURVEY RESULTS FOR  
 LOWER EMBARRASS LAKE, UNNAMED LAKE  
 & CEDAR ISLAND LAKE (EMBARRASS RIVER)  
 Surveyed August 18-19, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Barr Footer Date: 1/25/2011 4:48:40 PM File: I:\Client\Polymet\_Minima\Work\_Orders\Wild\_Rice\Mapa\Reports\Figure 5 Ground Wild Rice Survey Results for Esquagama Fourth and Lower Embarrass River.mxd User: am2

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage

- Stream and Shoreline Segments Surveyed in 2010
- Stream Segments Not Surveyed in 2010
- Rivers and Streams
- Electric Transmission Line

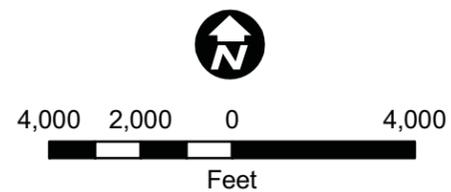
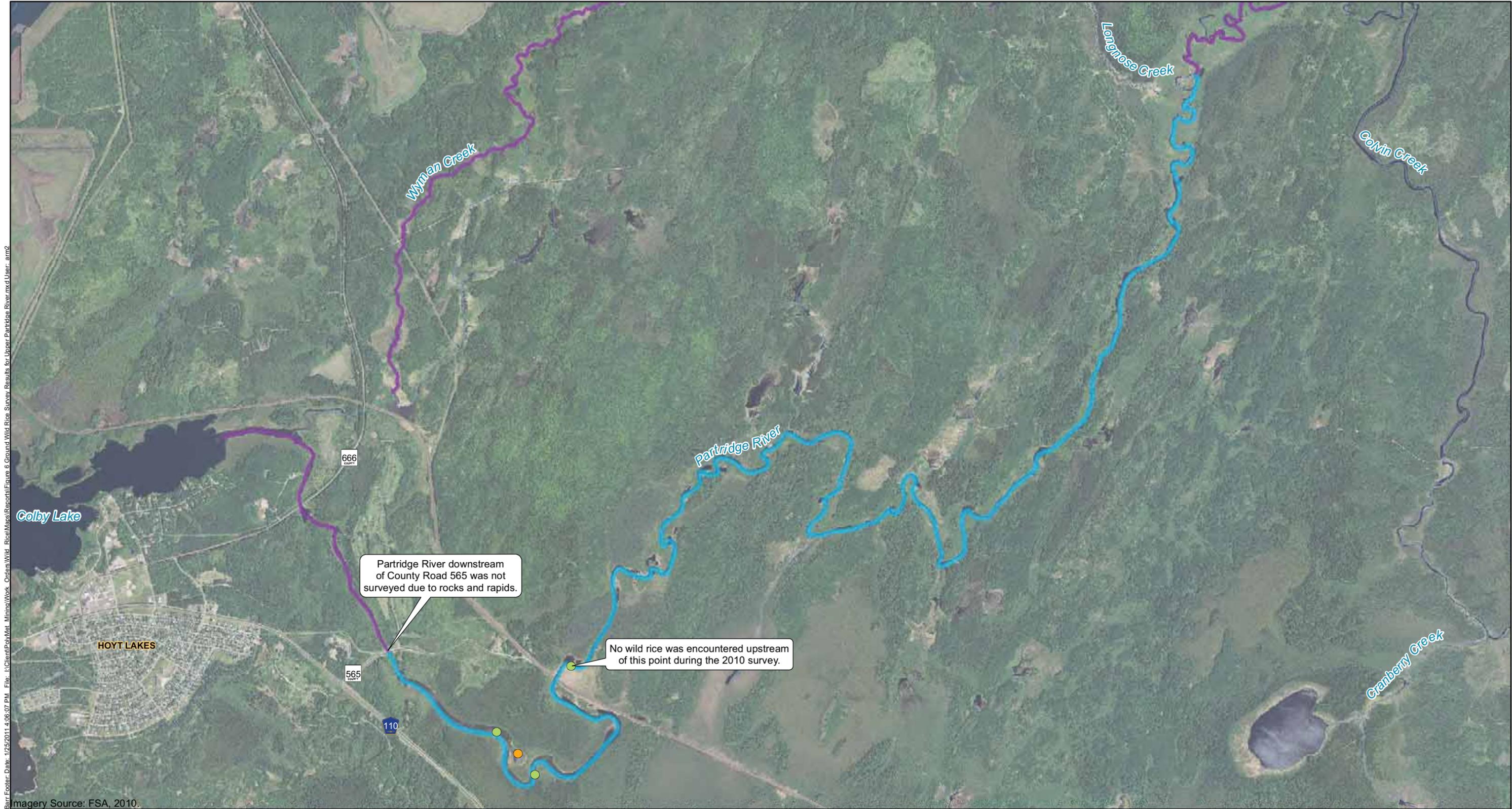


Figure 5  
 GROUND WILD RICE SURVEY RESULTS FOR  
 ESQUAGAMA LAKE, FOURTH LAKE AND  
 LOWER EMBARRASS RIVER (EMBARRASS RIVER)  
 Surveyed August 20 & September 1, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\Polymet\_Minima\Work\_Orders\Wild\_Rice\Mapa\Reports\Figure 6 Ground Wild Rice Survey Results for Upper Partridge River.mxd User: arm2  
 Date: 1/25/2011 4:06:07 PM  
 Imagery Source: FSA, 2010.

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage
- Stream Segments Surveyed in 2010
- Stream Segments Not Surveyed in 2010

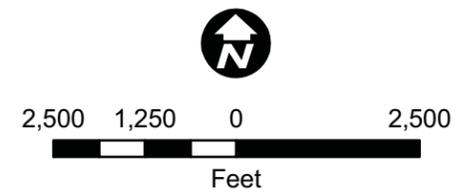
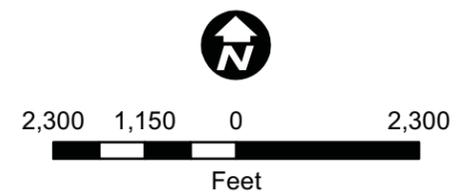
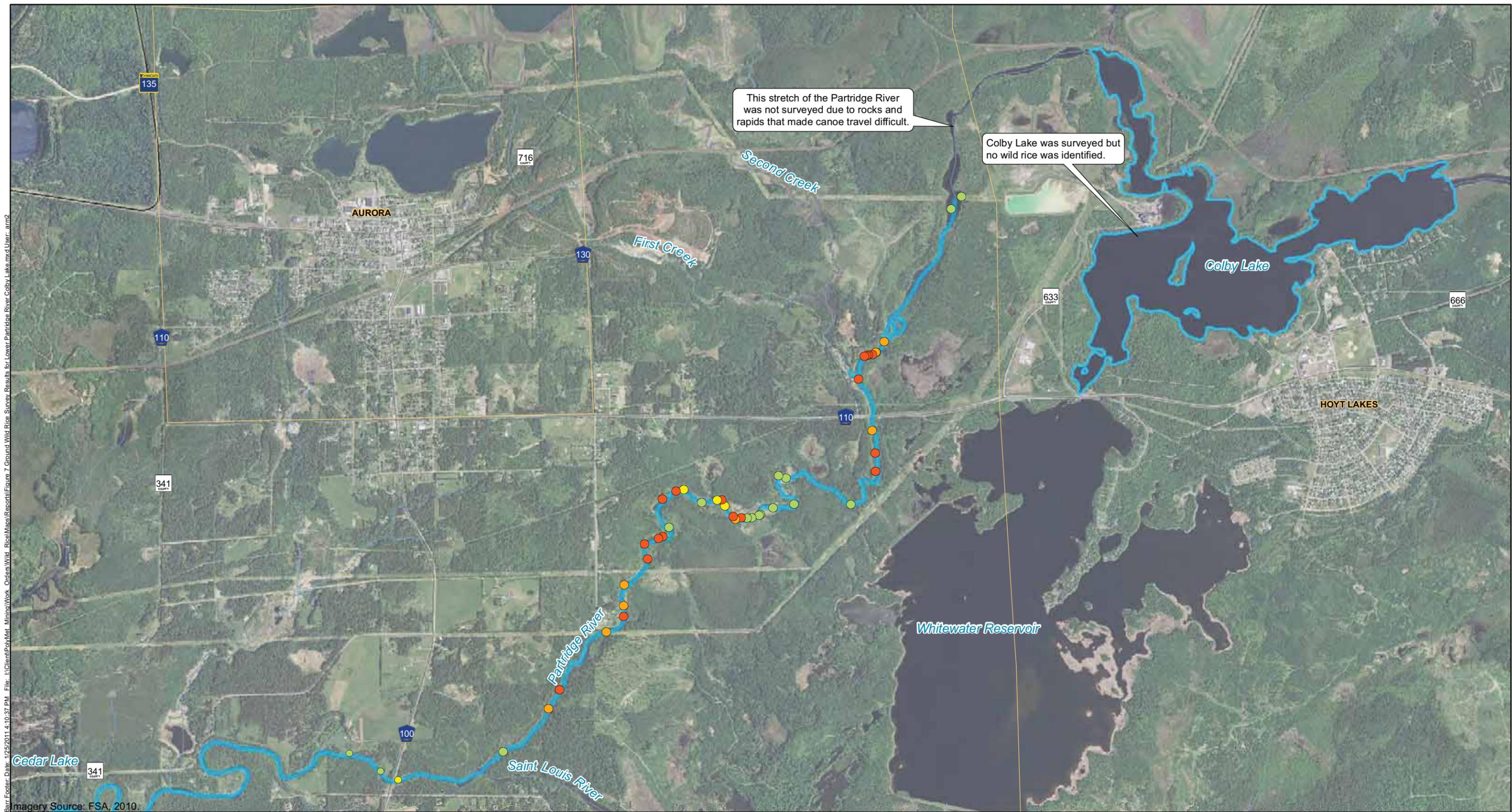
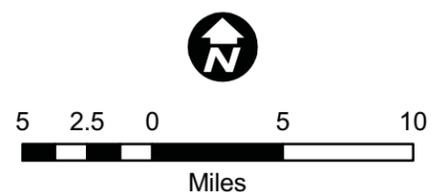
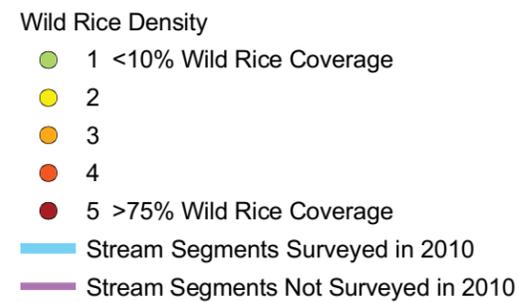
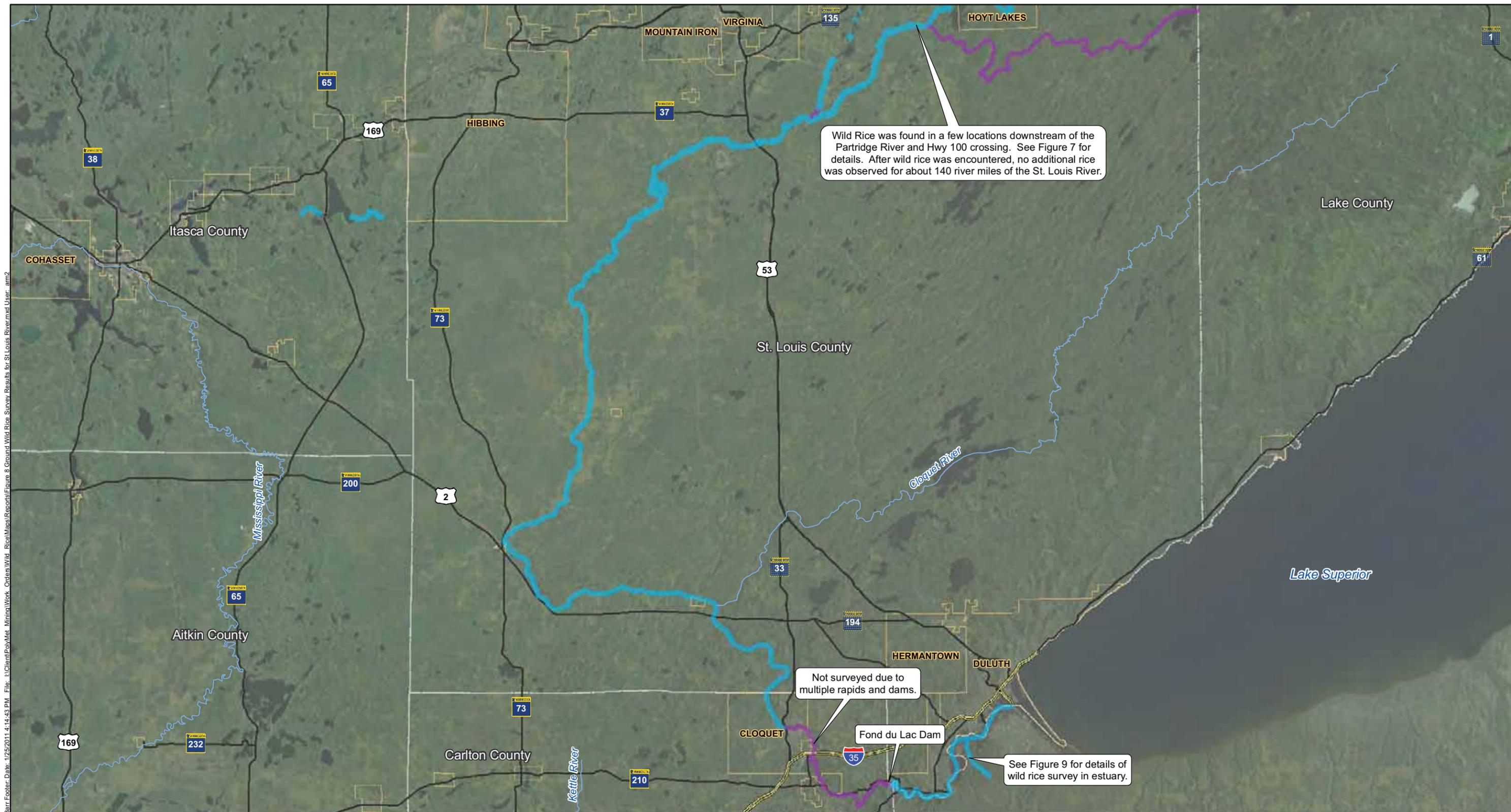


Figure 6  
 GROUND WILD RICE SURVEY RESULTS  
 FOR THE UPPER PARTRIDGE RIVER  
 Surveyed August 25, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

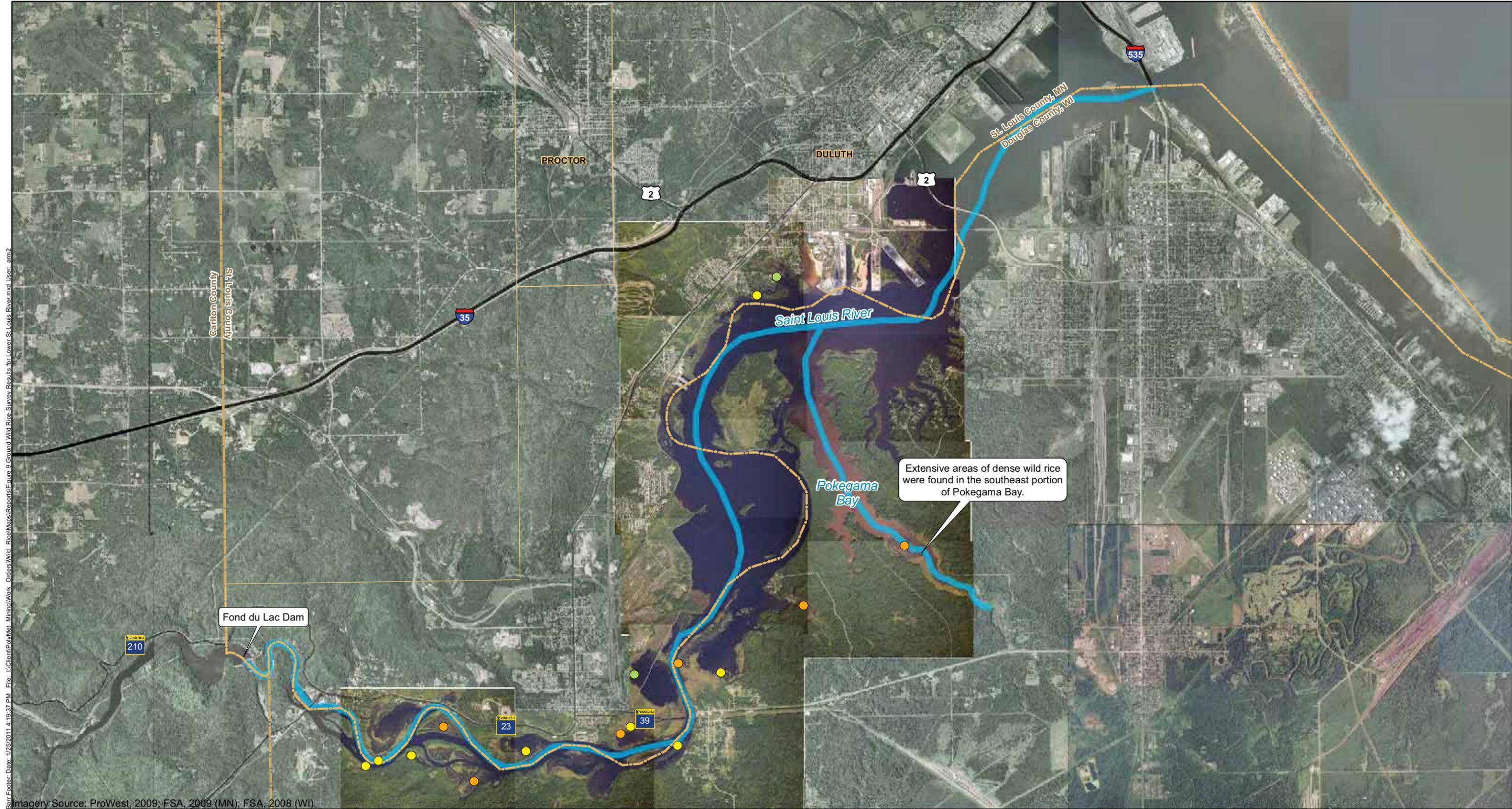


**Figure 7**  
**GROUND WILD RICE SURVEY RESULTS FOR COLBY LAKE, THE LOWER PARTRIDGE RIVER AND THE UPPER ST. LOUIS RIVER**  
 Surveyed July 26 & 28 and August 20 & 25-26, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Barr Footer Date: 1/25/2011 4:10:37 PM File: \\Client\poly\met\mining\work\Orders\Wild\_Rice\Mapa\Reports\Figure 7 Ground Wild Rice Survey Results for Lower Partridge River Colby Lake.mxd User: am2  
 Imagery Source: FSA, 2010.



**Figure 8**  
**GROUND WILD RICE SURVEY RESULTS FOR THE ST. LOUIS RIVER FROM ITS CONFLUENCE WITH THE PARTRIDGE RIVER TO THE ST. LOUIS RIVER ESTUARY**  
 Surveyed July & August, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: \\Client\Polymet\_Minima\Work\_Orders\Wild\_Rice\Mapa\Reports\Figure 9 Ground Wild Rice Survey Results for Lower St. Louis River.mxd User: am2  
 Date: 1/25/2011 4:19:37 PM

Imagery Source: ProWest, 2009; FSA, 2009 (MN); FSA, 2008 (WI)

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
- Stream Segment Surveyed in 2010
- City Boundaries
- County Boundary

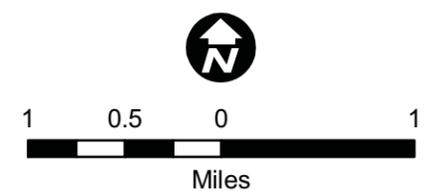
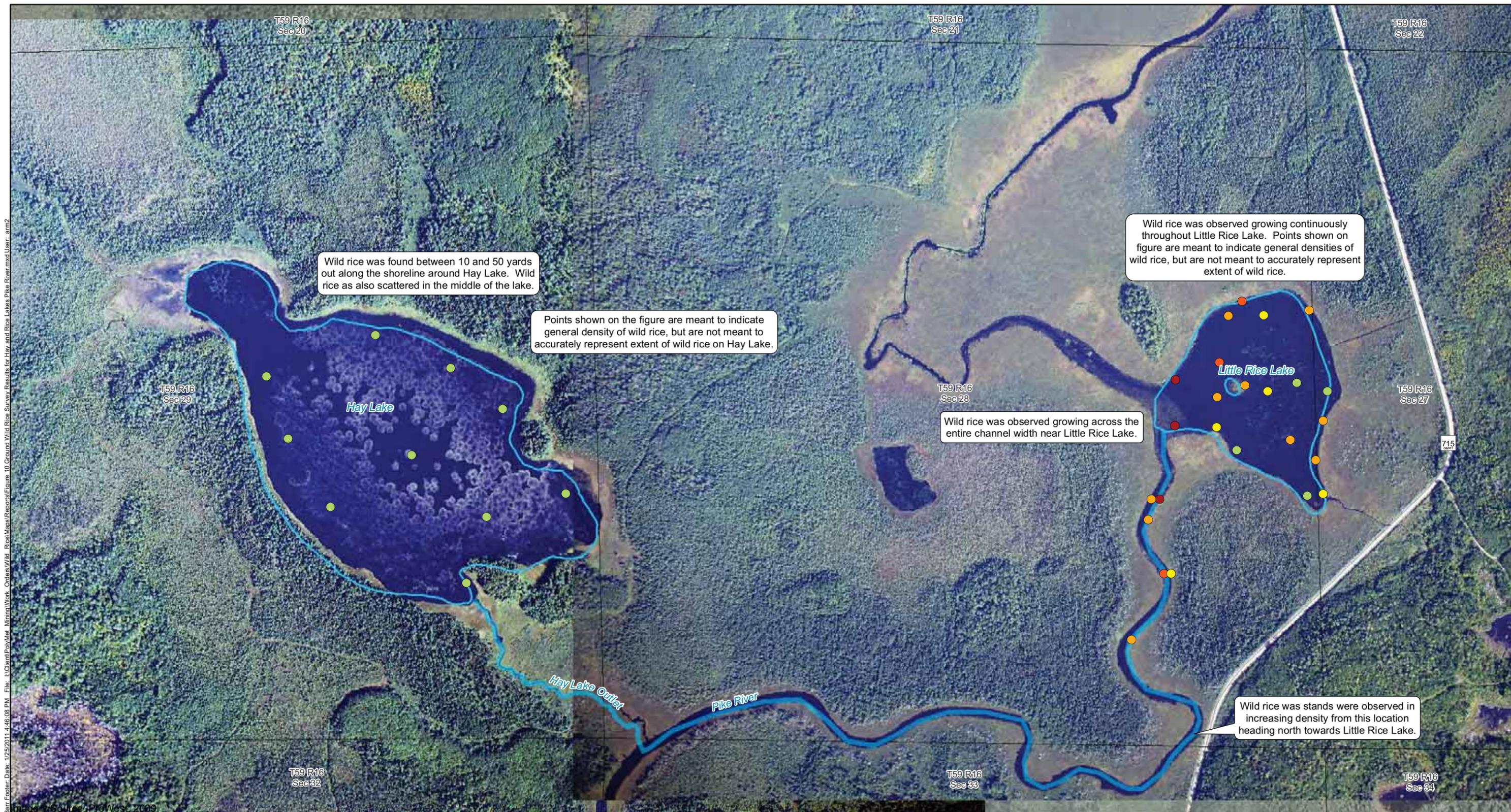


Figure 9  
 GROUND WILD RICE SURVEY RESULTS FOR  
 POKEGAMA BAY AND LOWER ST. LOUIS RIVER  
 Surveyed August 16-17, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Map Source: ProWest, 2009.

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage
- Stream and Shoreline  
 Segments Surveyed in 2010
- Section Boundaries

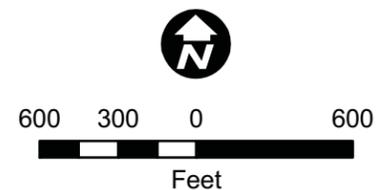
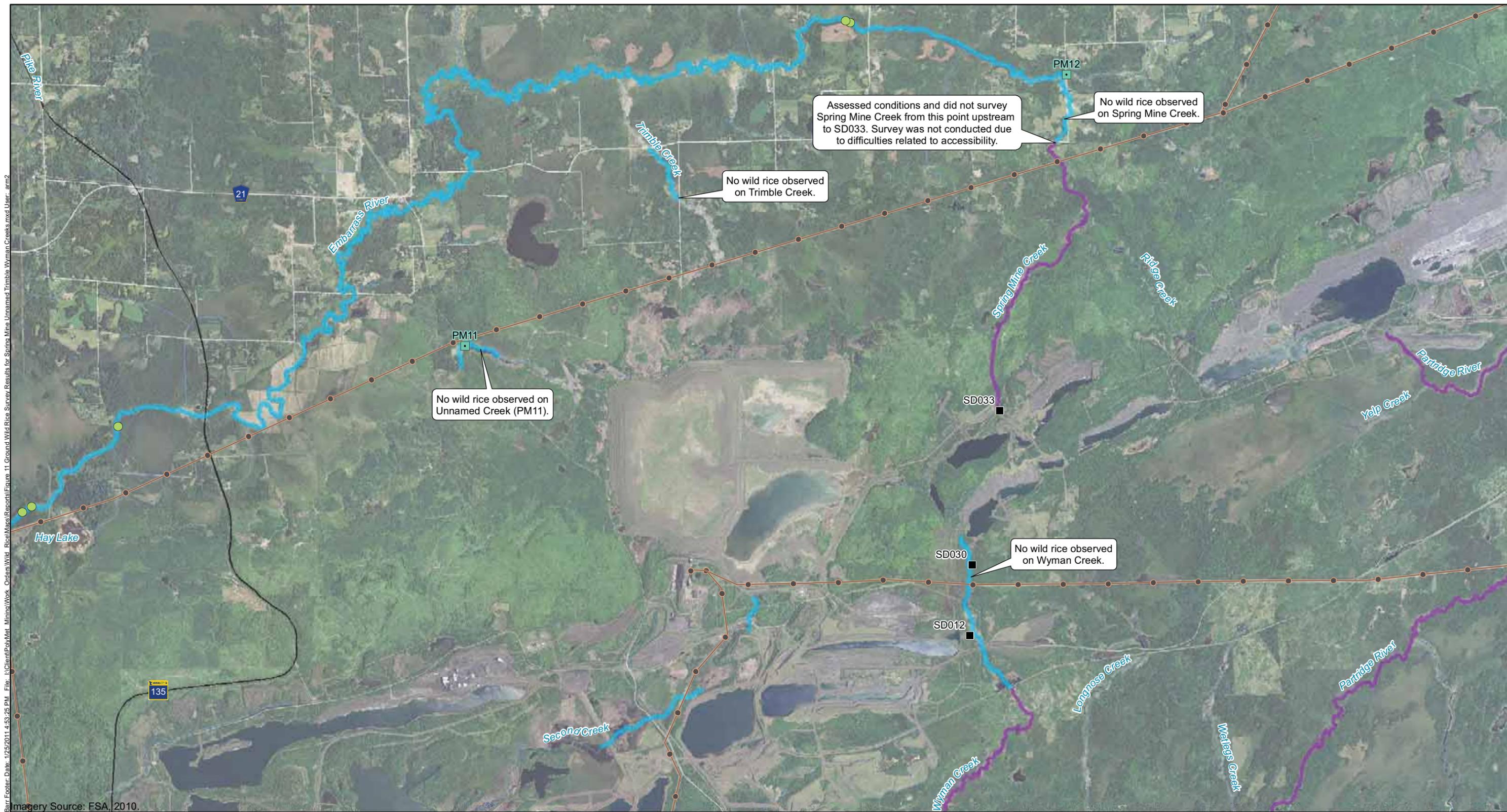


Figure 10  
 GROUND WILD RICE SURVEY RESULTS  
 FOR HAY LAKE (MN ID 690579), LITTLE RICE  
 LAKE (MN ID 690578) AND THE PIKE RIVER  
 Surveyed August 31, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: \\Client\poly\met\_minima\work\_orders\wild\_rice\reports\figure\_11\_ground\_wild\_rice\_survey\_results\_for\_spring\_mine\_unnamed\_trimble\_wyman\_creeks.mxd User: arm2  
 Date: 1/25/2011 4:53:25 PM  
 Imagery Source: FSA, 2010.

- Surface Water Monitoring Locations
- Existing Surface Discharges
- Wild Rice Density
- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Stream or Shoreline Segment Surveyed in 2010
- Stream Segments Not Surveyed in 2010
- Electric Transmission Line

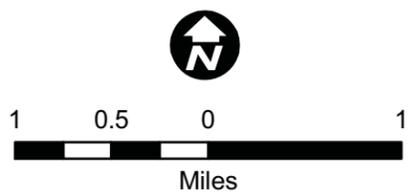


Figure 11  
 GROUND WILD RICE SURVEY RESULTS FOR  
 SPRING MINE CREEK, UNNAMED CREEK (PM11),  
 TRIMBLE CREEK AND WYMAN CREEK  
 Surveyed Aug 12 & 27 and Sept 9, 2010  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Path: Footer Date: 1/25/2011 5:01:44 PM File: I:\Client\Polymet\Minima\Work Orders\Wild Rice\Mapa\Reports\Figure 12 Ground Wild Rice Survey Results for Second Creek.mxd User: am2



- Wild Rice Density
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage

- Stream or Shoreline Segment Surveyed in 2010
- Stream Segments Surveyed in 2009
- Electric Transmission Line

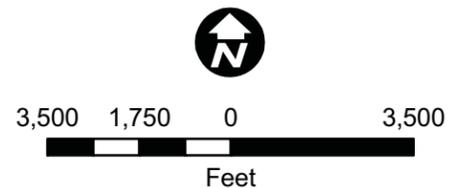


Figure 12  
GROUND WILD RICE SURVEY  
RESULTS FOR SECOND CREEK  
Surveyed September 10, 2010  
NorthMet Project  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota



**GRID 22**  
 2010: 0.65 Stems/0.5 Meter<sup>2</sup>  
 22.8 mg/L - Sulfate  
 2009: 18.9 Stems/0.5 Meter<sup>2</sup>  
 21.2 mg/L - Sulfate

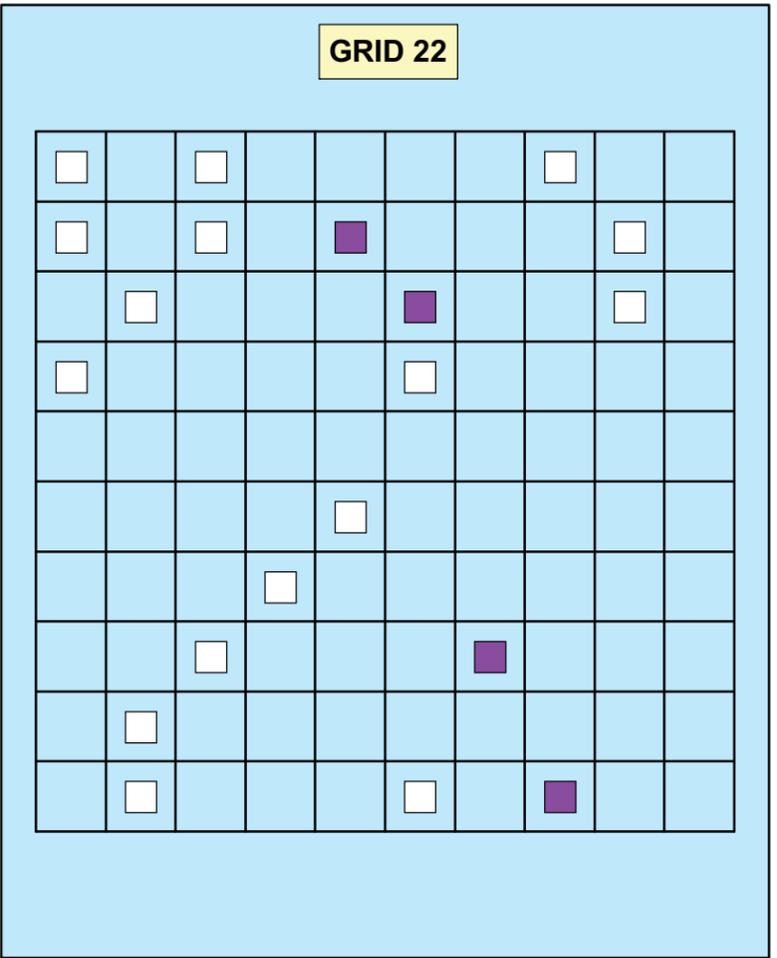
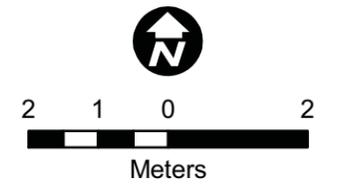


Figure 13  
 GRID DENSITY CALCULATIONS  
 LOWER EMBARRASS LAKE  
 (EMBARRASS RIVER)  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Stem Density/0.5m<sup>2</sup>

- 0
- 1 - 25
- 10x10 Meter Grid



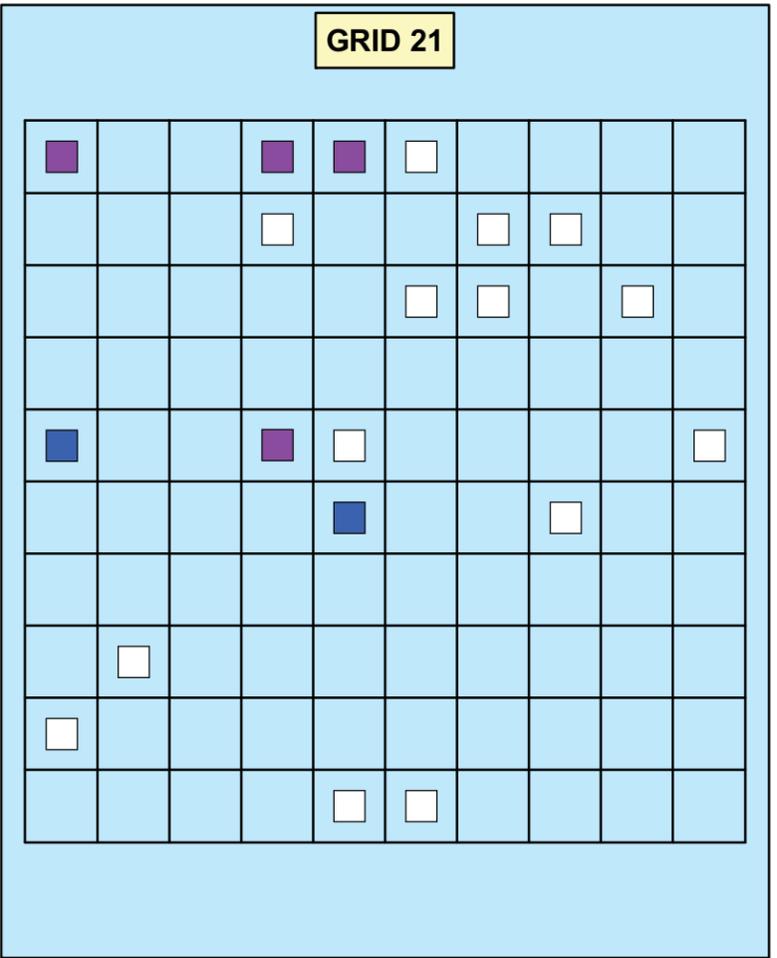
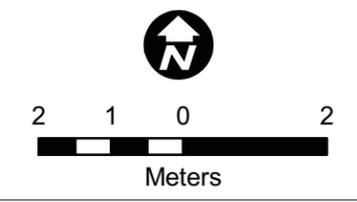


Figure 14  
 GRID DENSITY CALCULATIONS  
 UNNAMED LAKE (EMBARRASS RIVER)  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Stem Density/0.5m<sup>2</sup>

- 0
- 1 - 25
- 26 - 50

— 10x10 Meter Grid



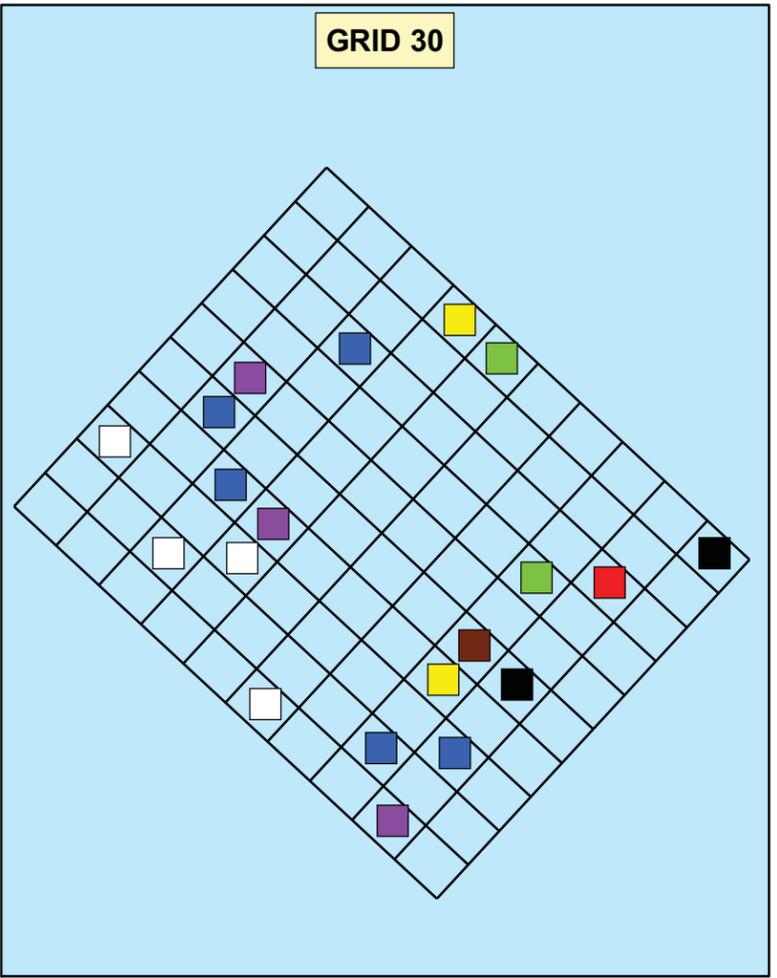
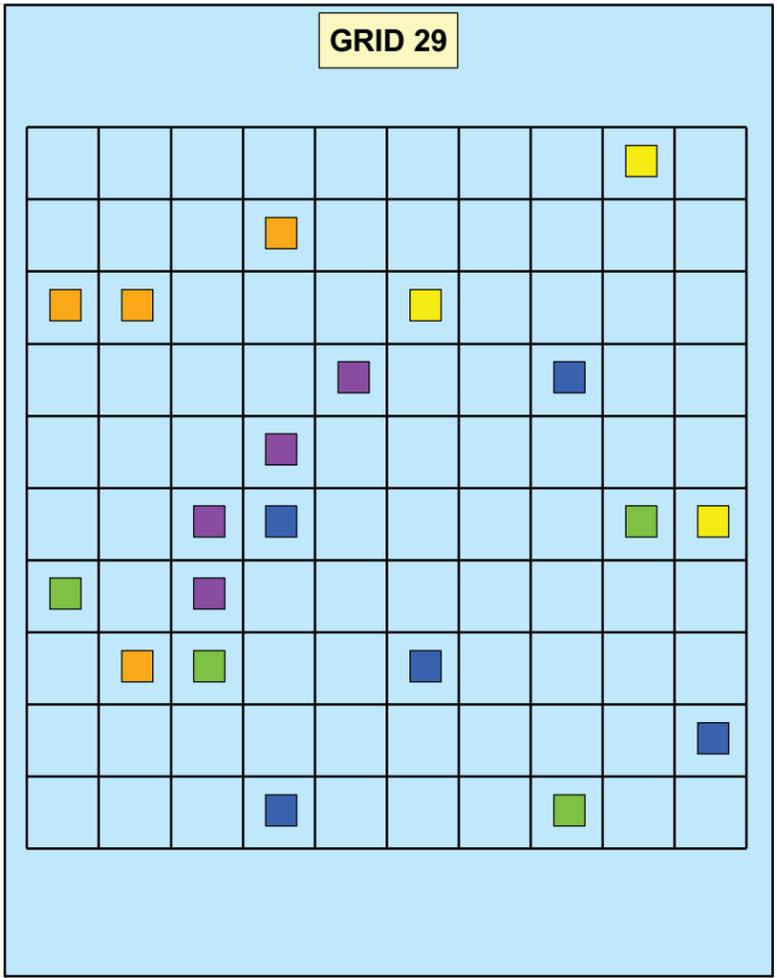
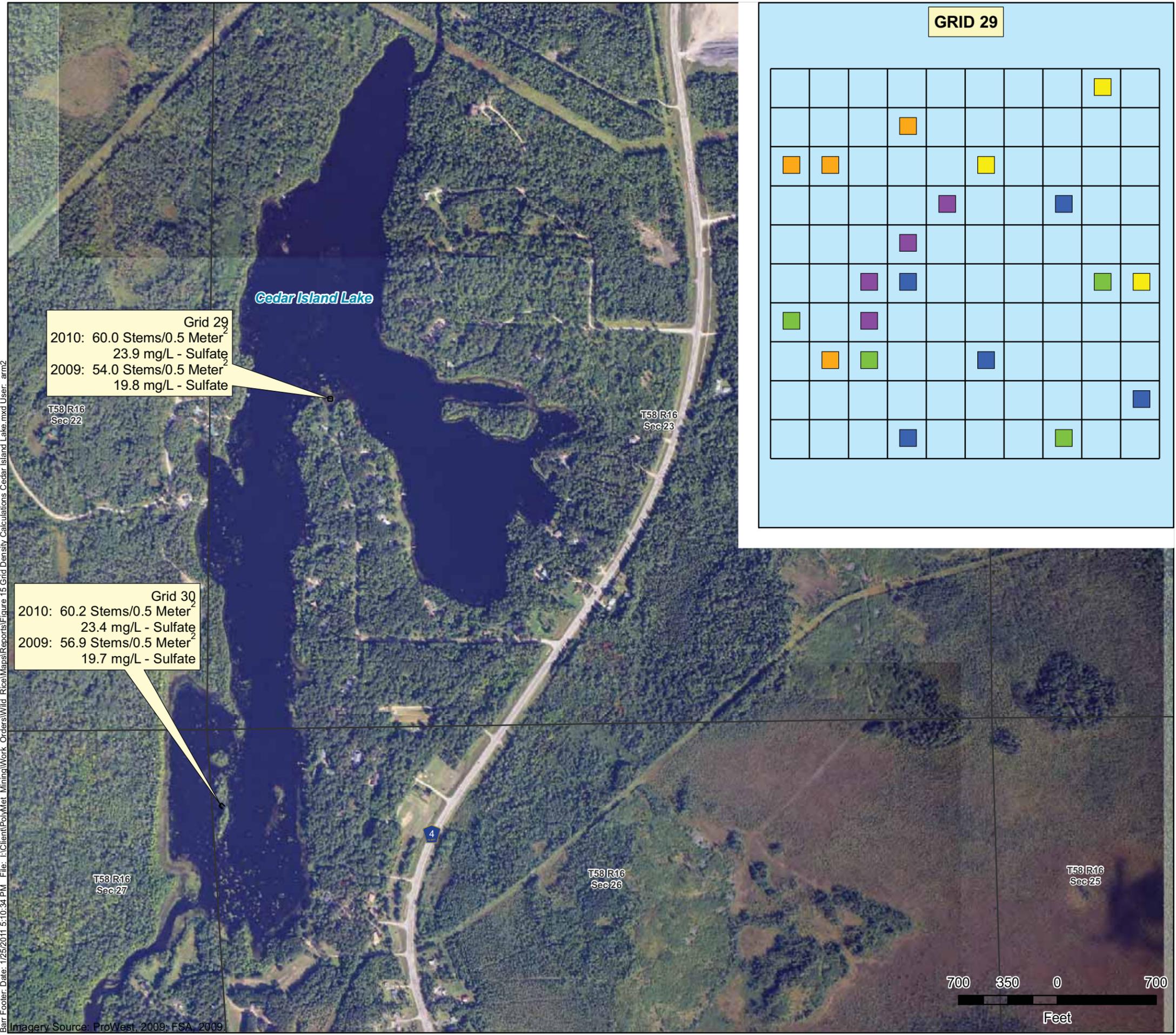
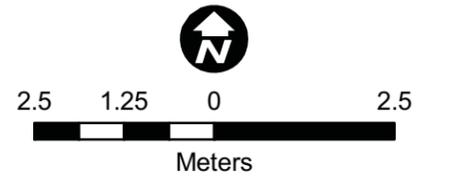
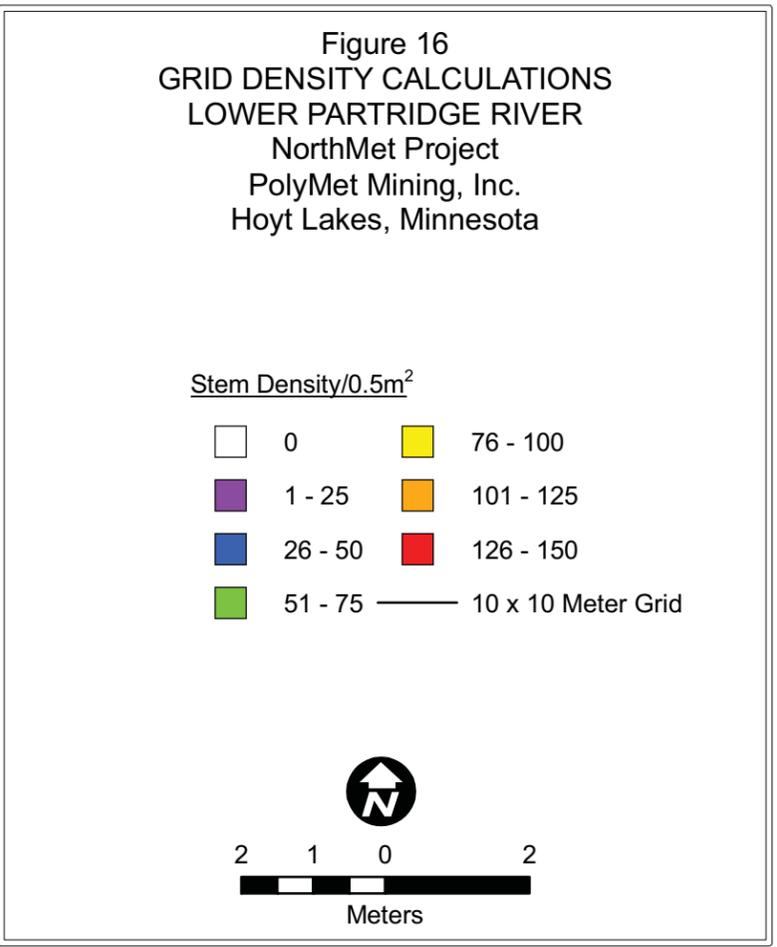
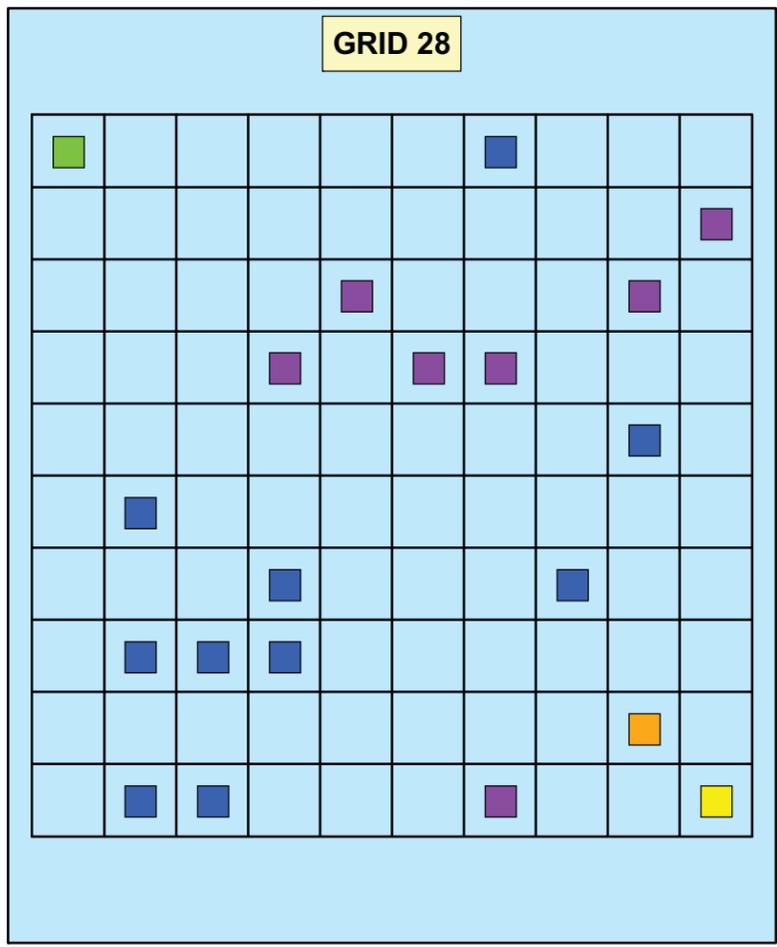
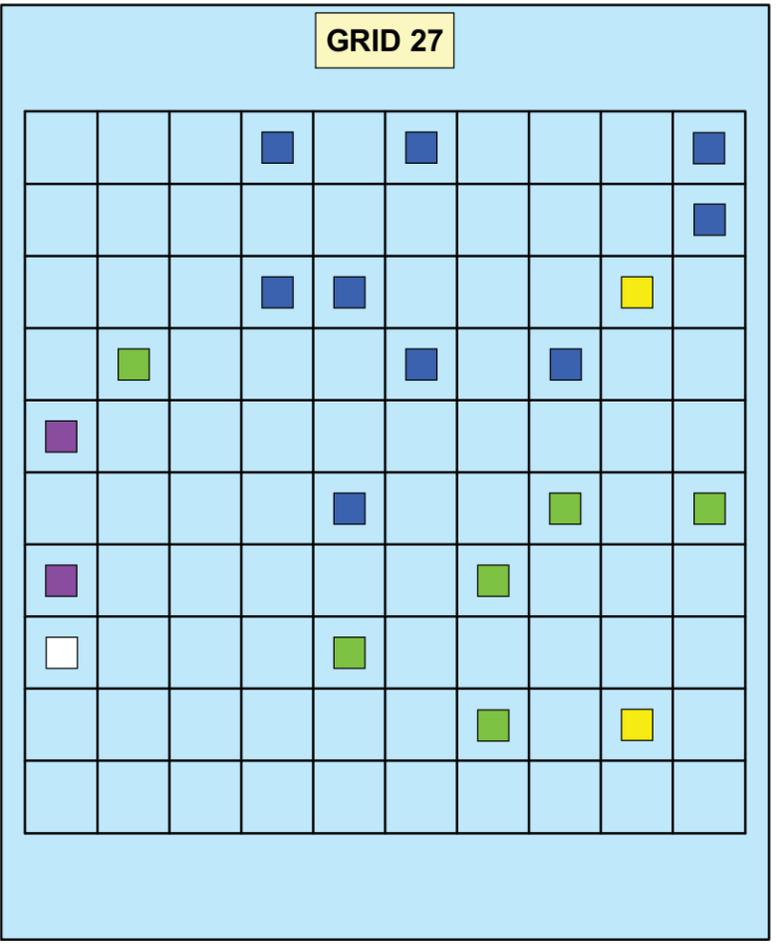
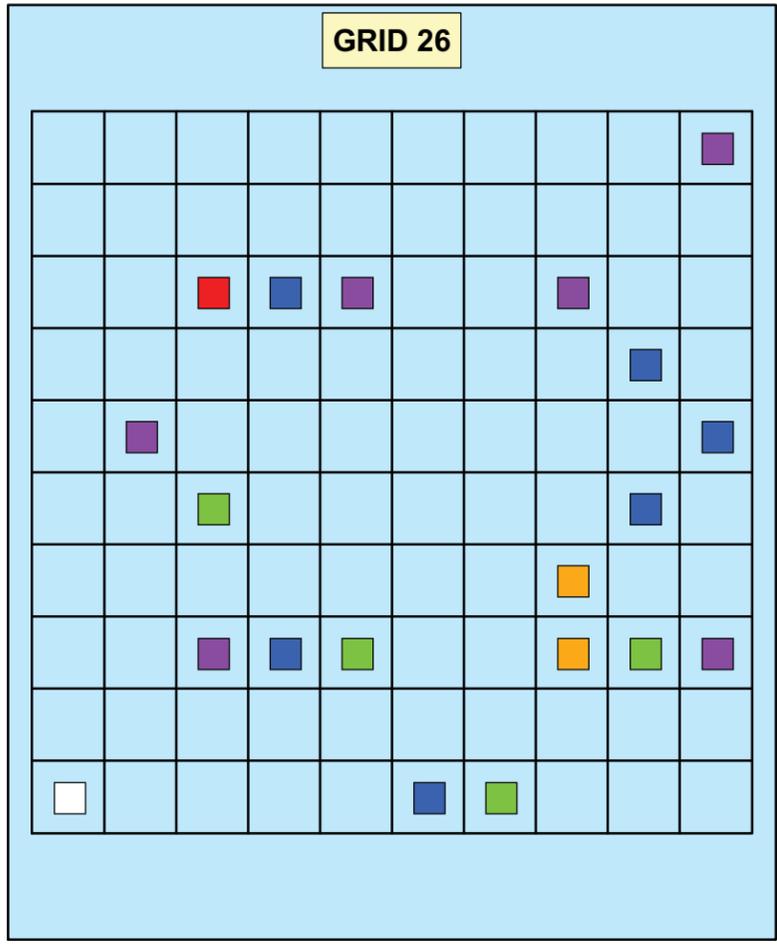
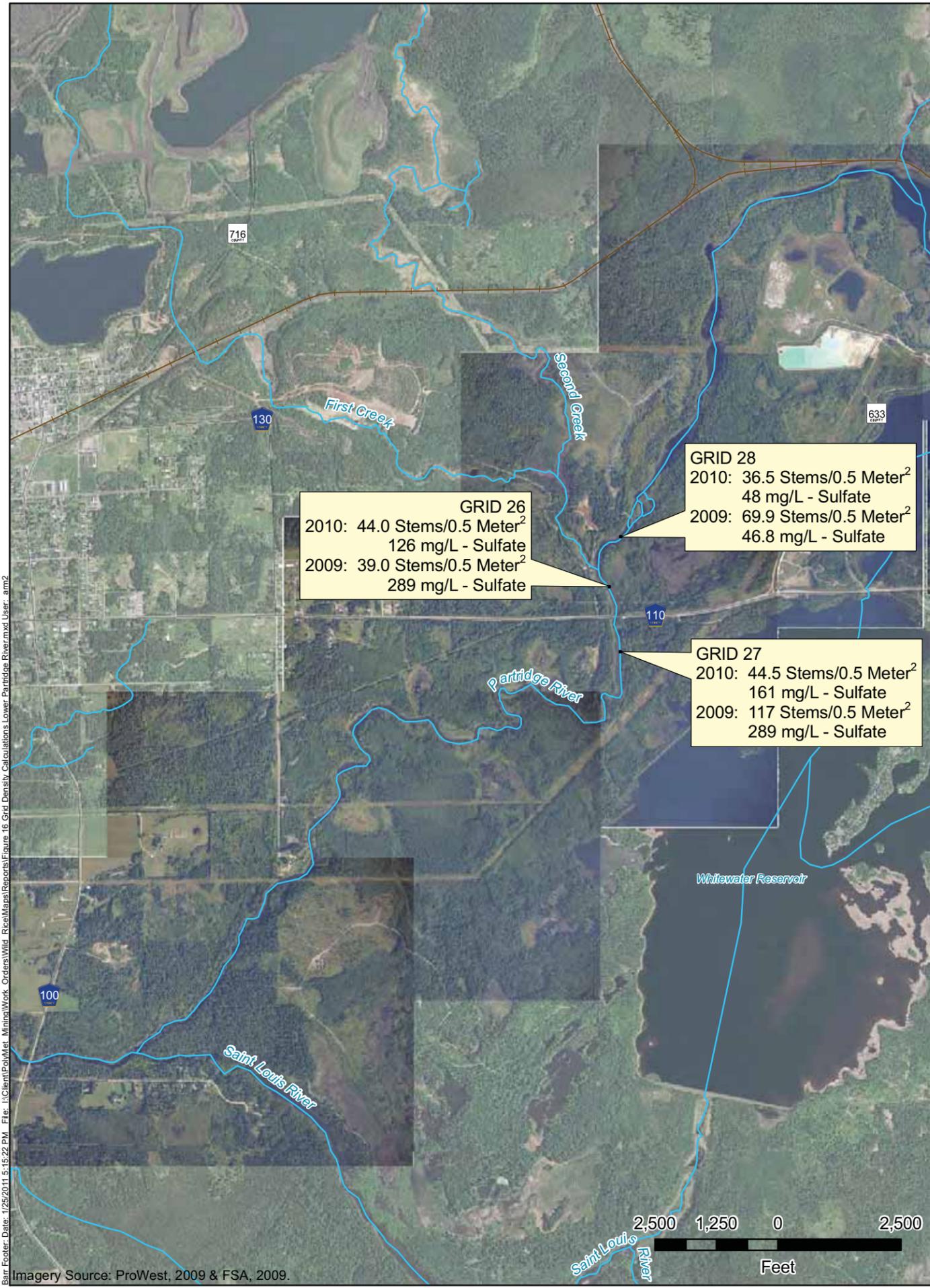


Figure 15  
 GRID DENSITY CALCULATIONS  
 CEDAR ISLAND LAKE (EMBARRASS RIVER)  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Stem Density/0.5m<sup>2</sup>

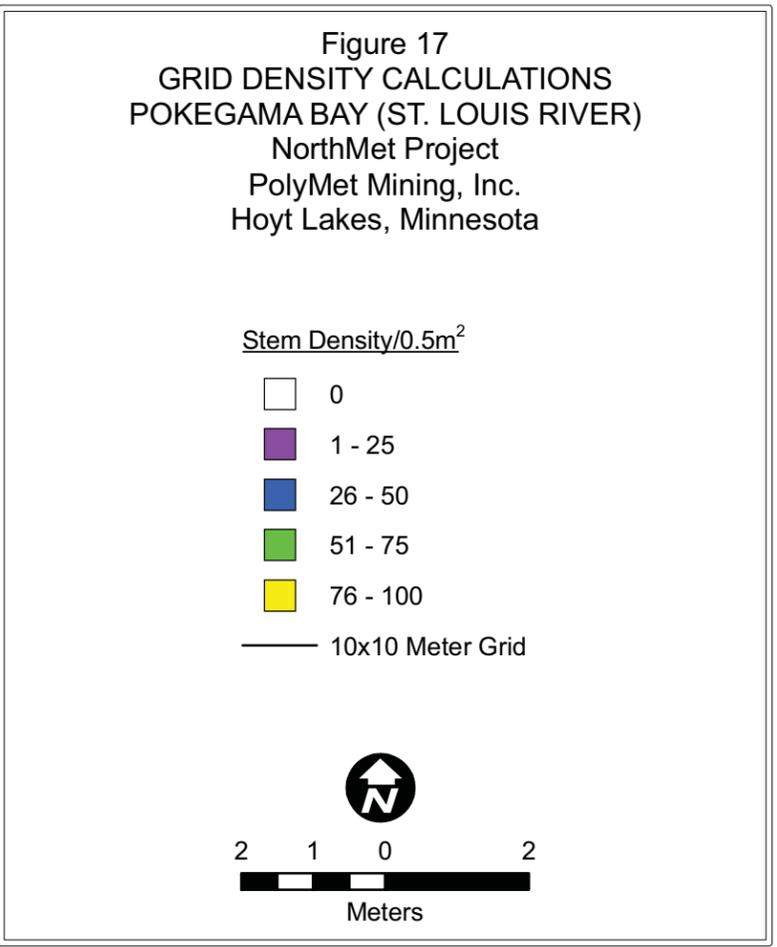
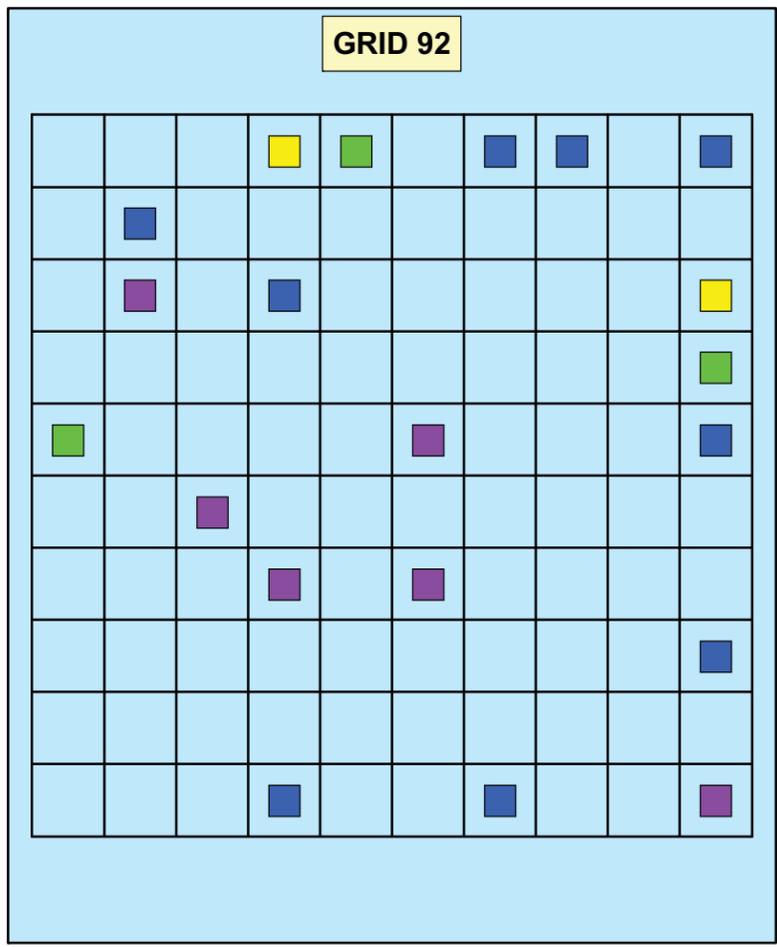
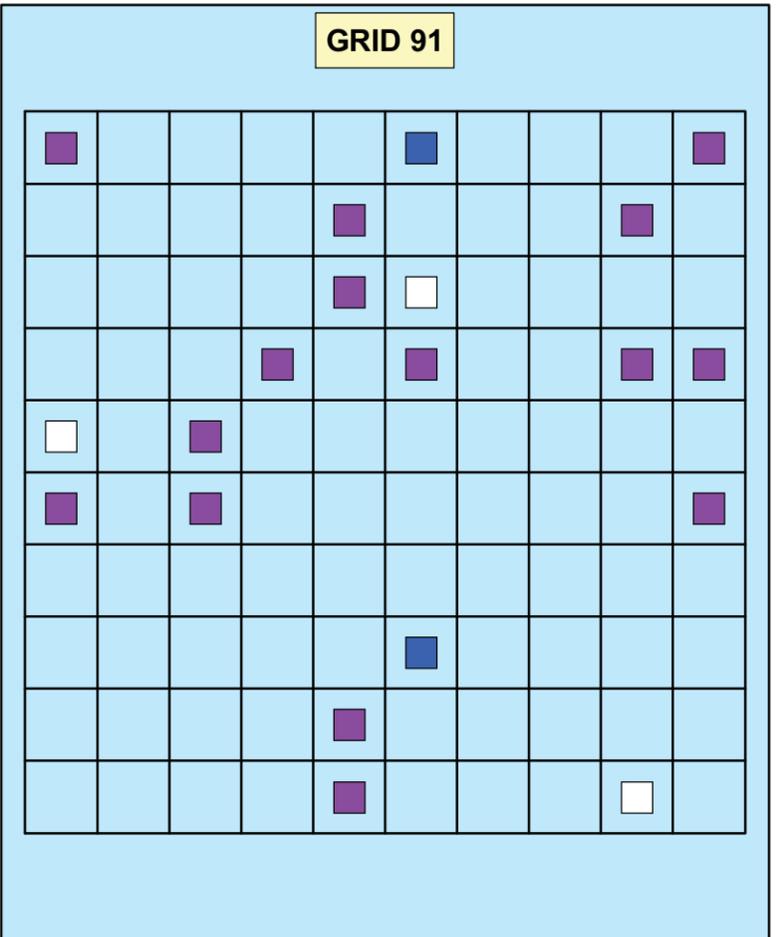
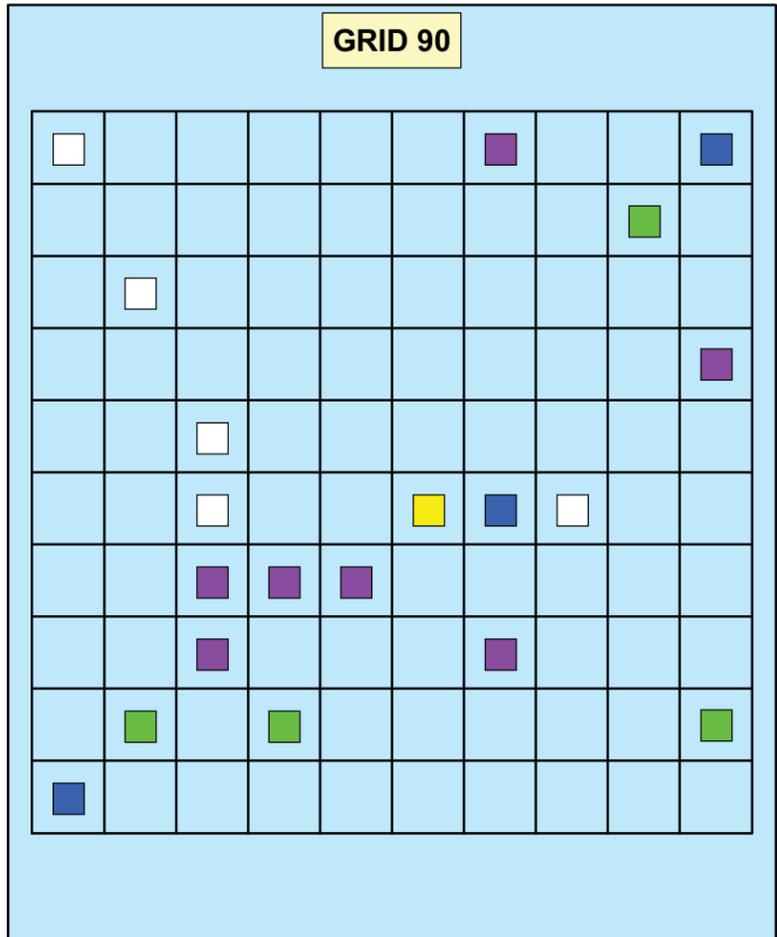
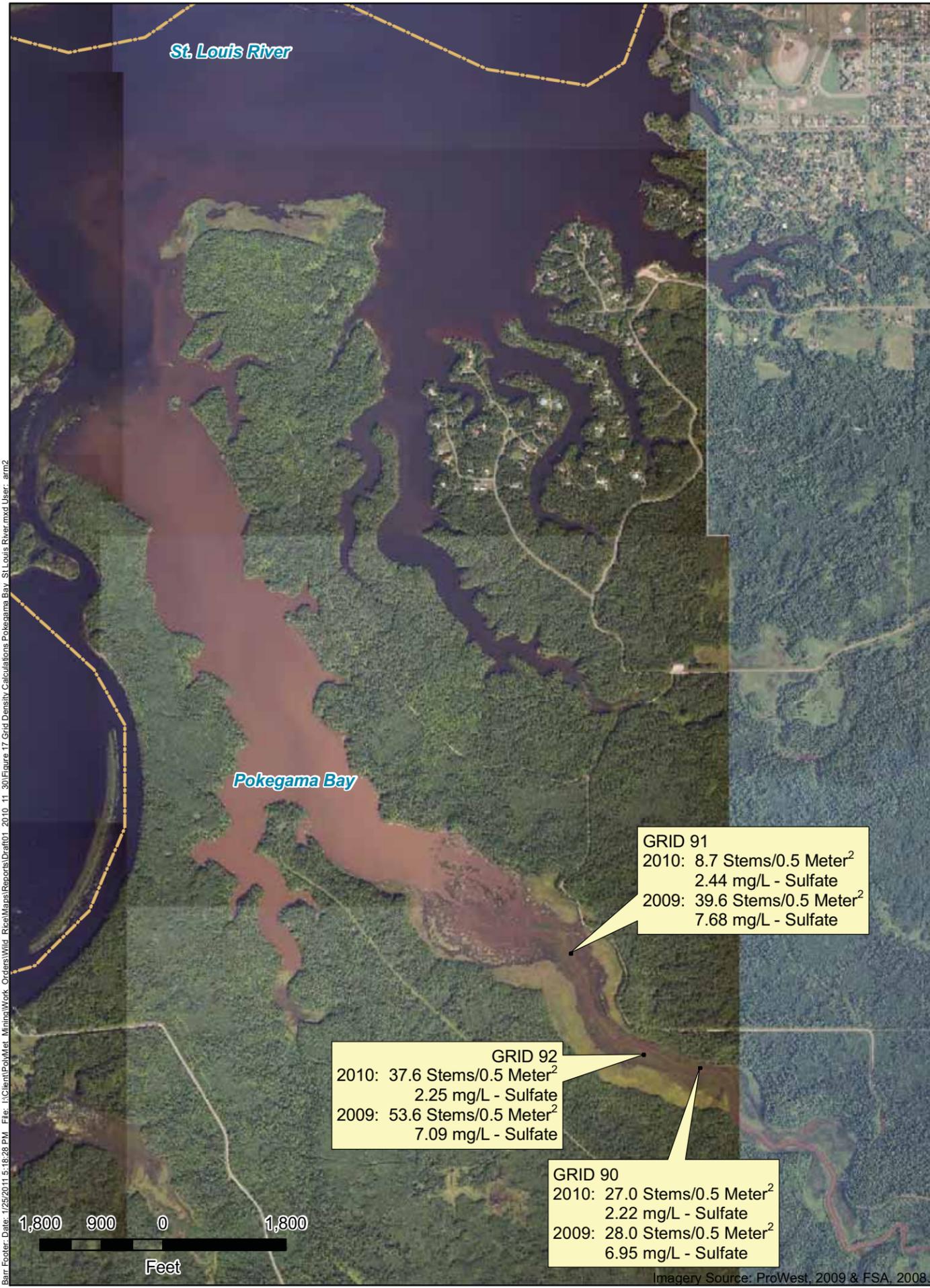
0	100 - 125
1 - 25	126 - 150
26 - 50	151 - 175
51 - 75	176 - 200
76 - 100	10x10 Meter Grid





Barr Footer: Date: 1/25/2014 5:15:22 PM File: I:\Client\PolyMet\_Minning\Work\_Orders\Wild\_River\Maps\Reports\Figure 16 Grid Density Calculations Lower Partridge River.mxd User: arm2

Imagery Source: ProWest, 2009 & FSA, 2009.



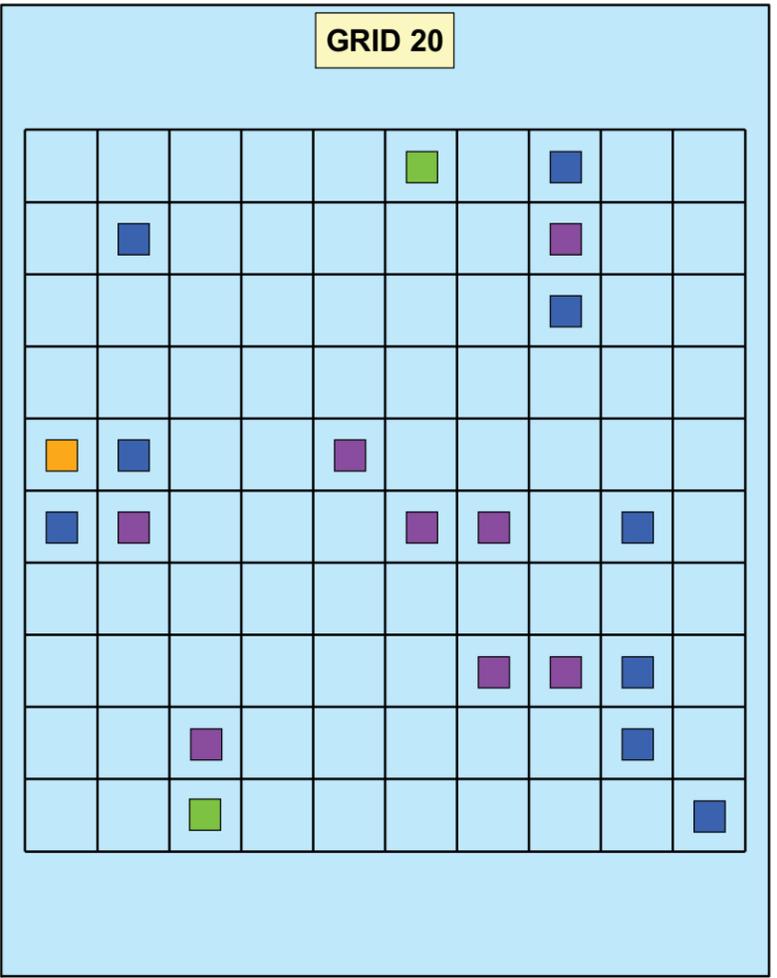
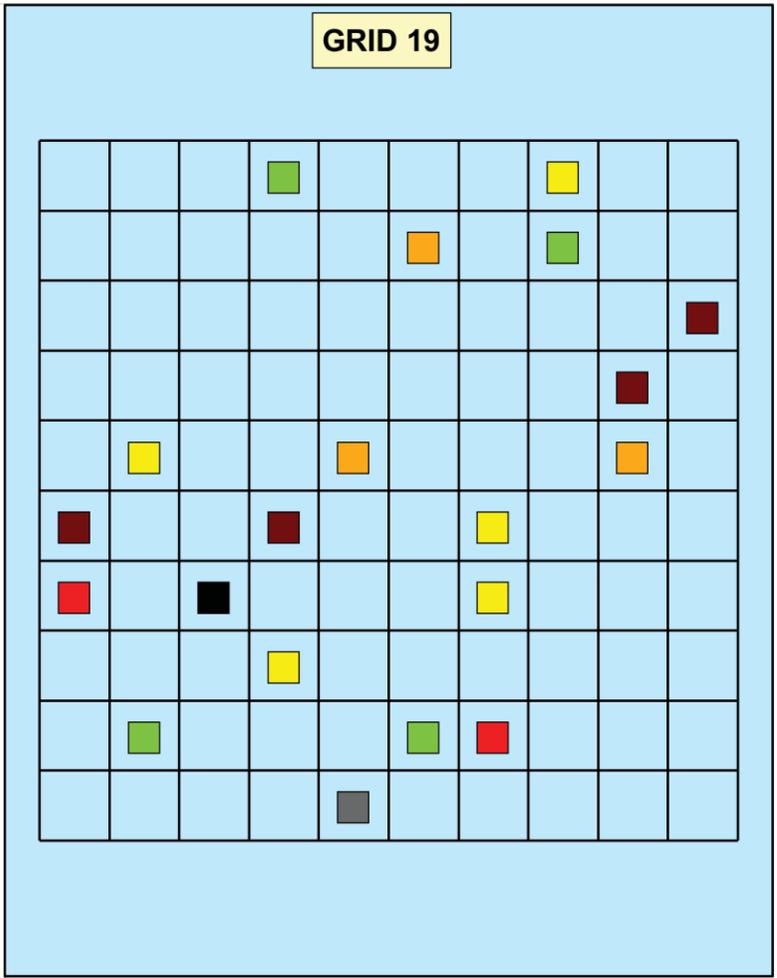
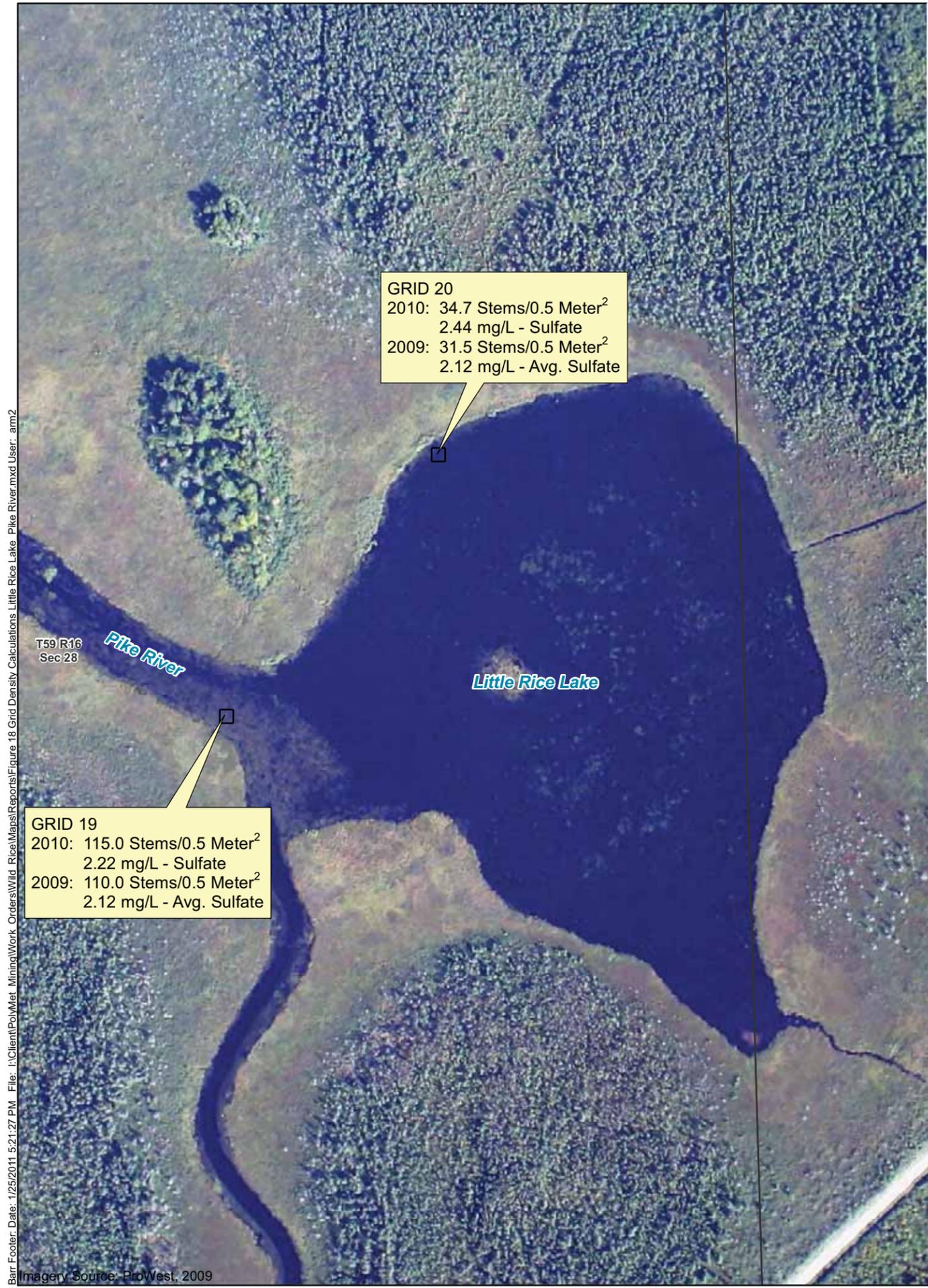


Figure 18  
 GRID DENSITY CALCULATIONS  
 LITTLE RICE LAKE (PIKE RIVER)  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

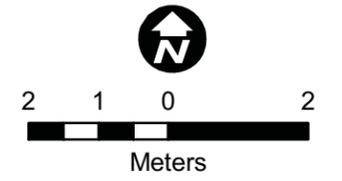
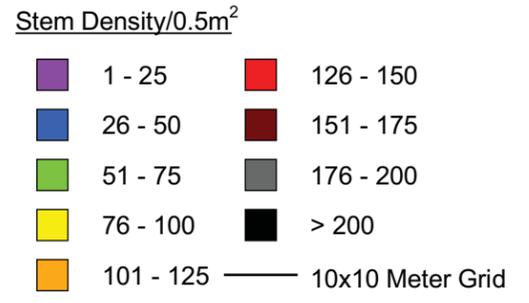


Figure 19 Median, Mean, and Standard Deviation of  
Total Calculated Plant Weight (g) in the St Louis River, Partridge River, Pike River, and Embarass River Water Bodies

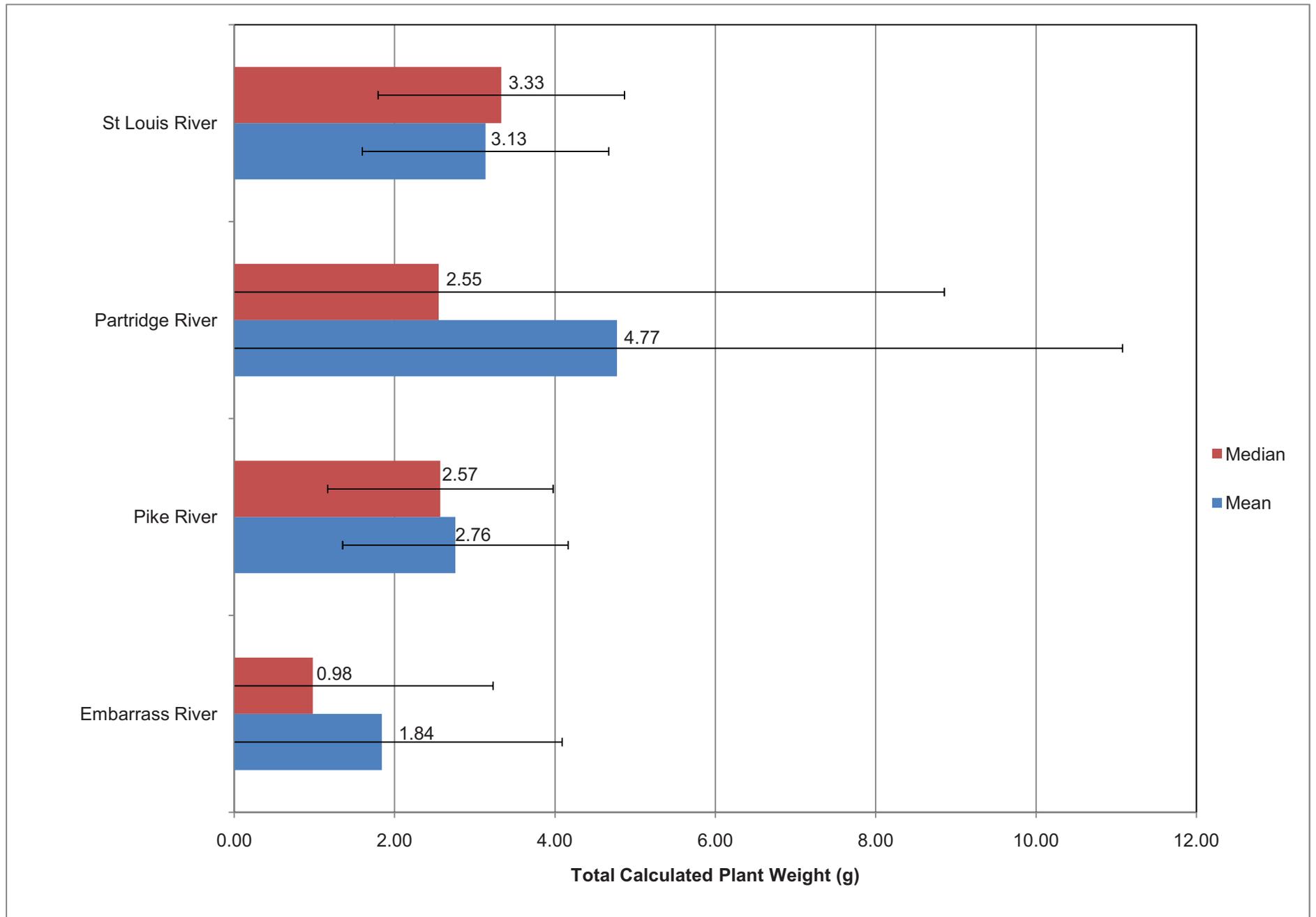


Figure 20 Median, Mean, and Standard Deviation of Root Weight (g) in the St Louis River, Partridge River, Pike River, and Embarass River Water Bodies

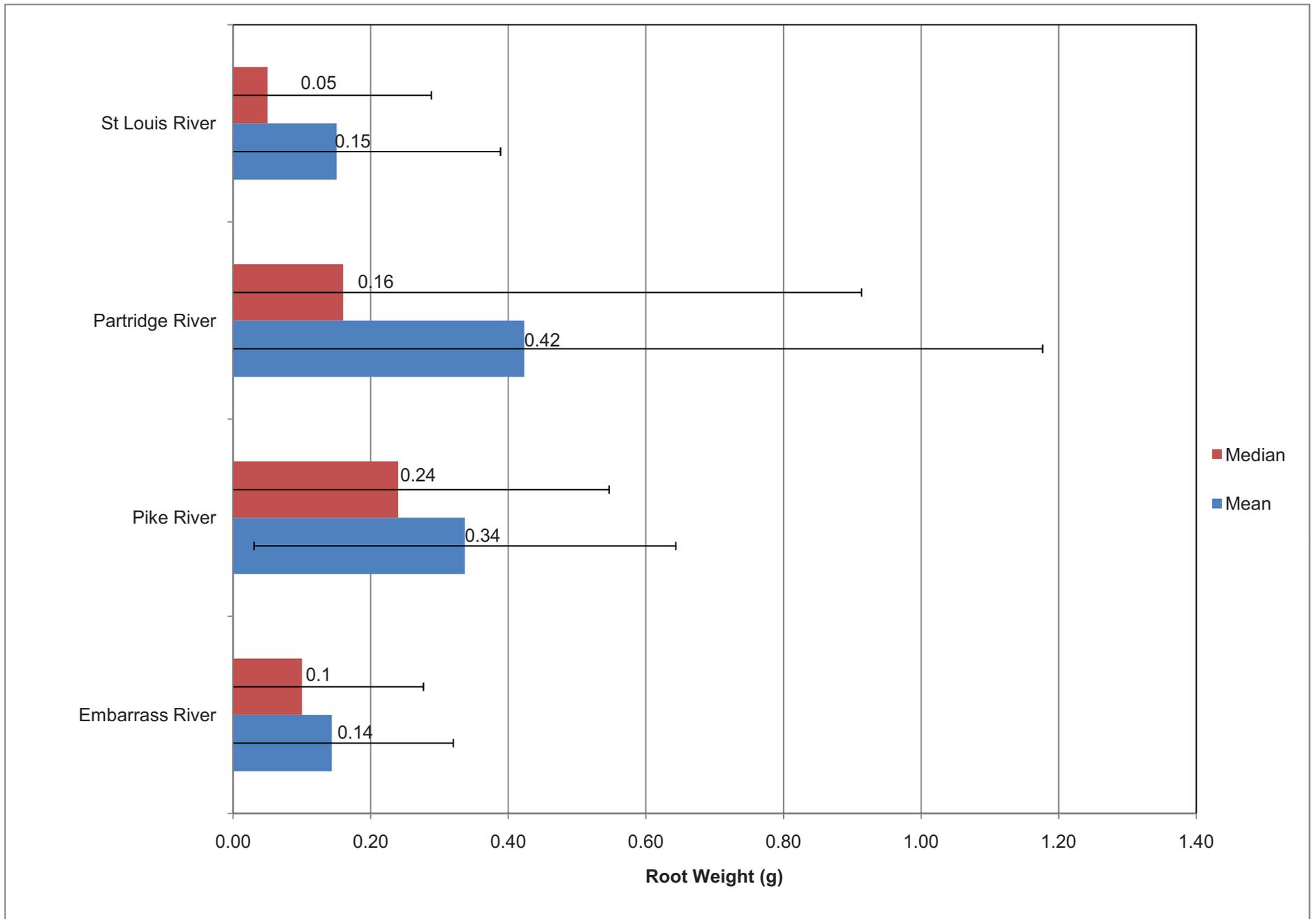


Figure 21 Median, Mean, and Standard Deviation of Shoot Weight (g) in the St Louis River, Partridge River, Pike River, and Embarass River Water Bodies

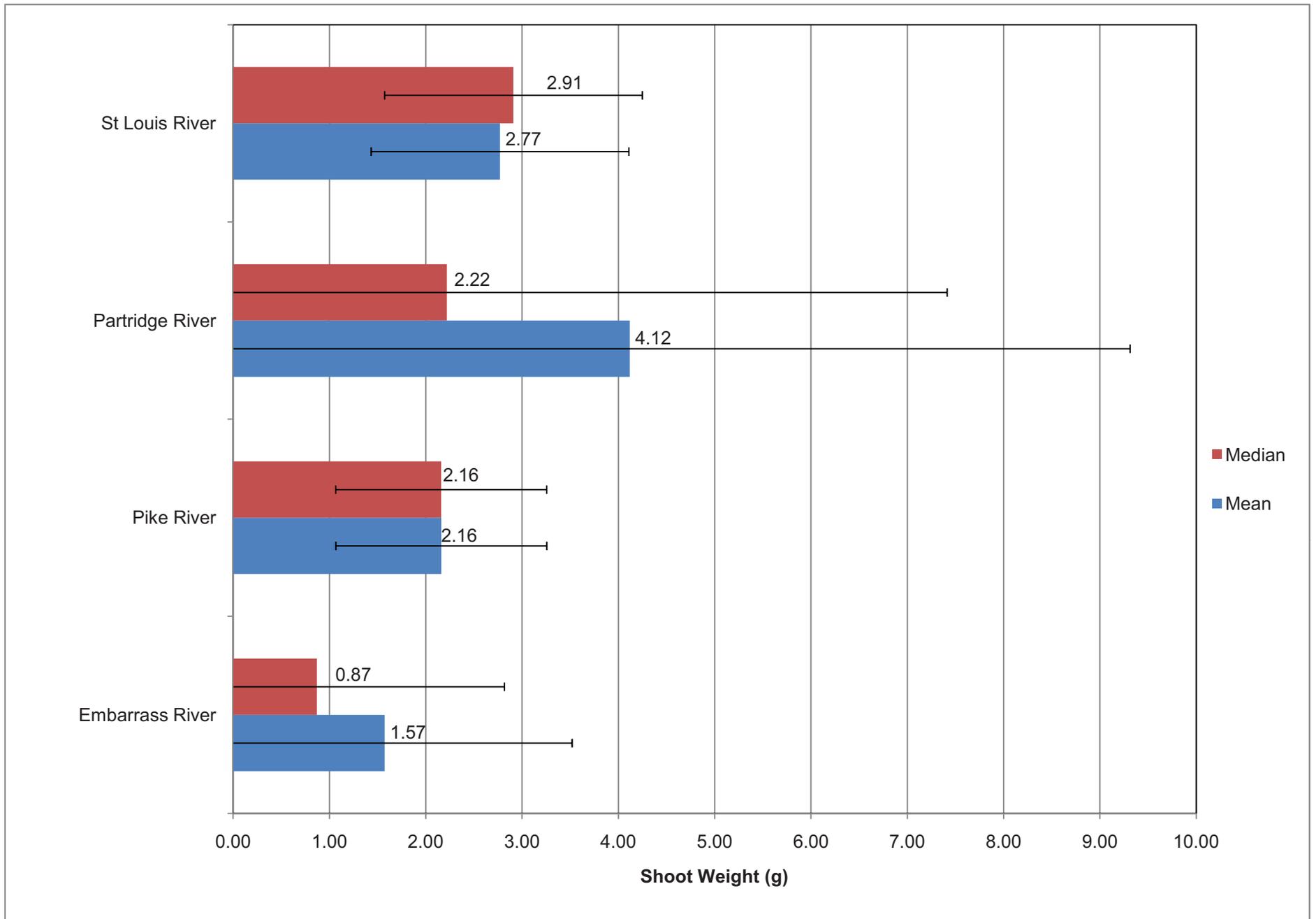


Figure 22 Median, Mean, and Standard Deviation of Seed Weight (g) in the St Louis River, Partridge River, Pike River, and Embarass River Water Bodies

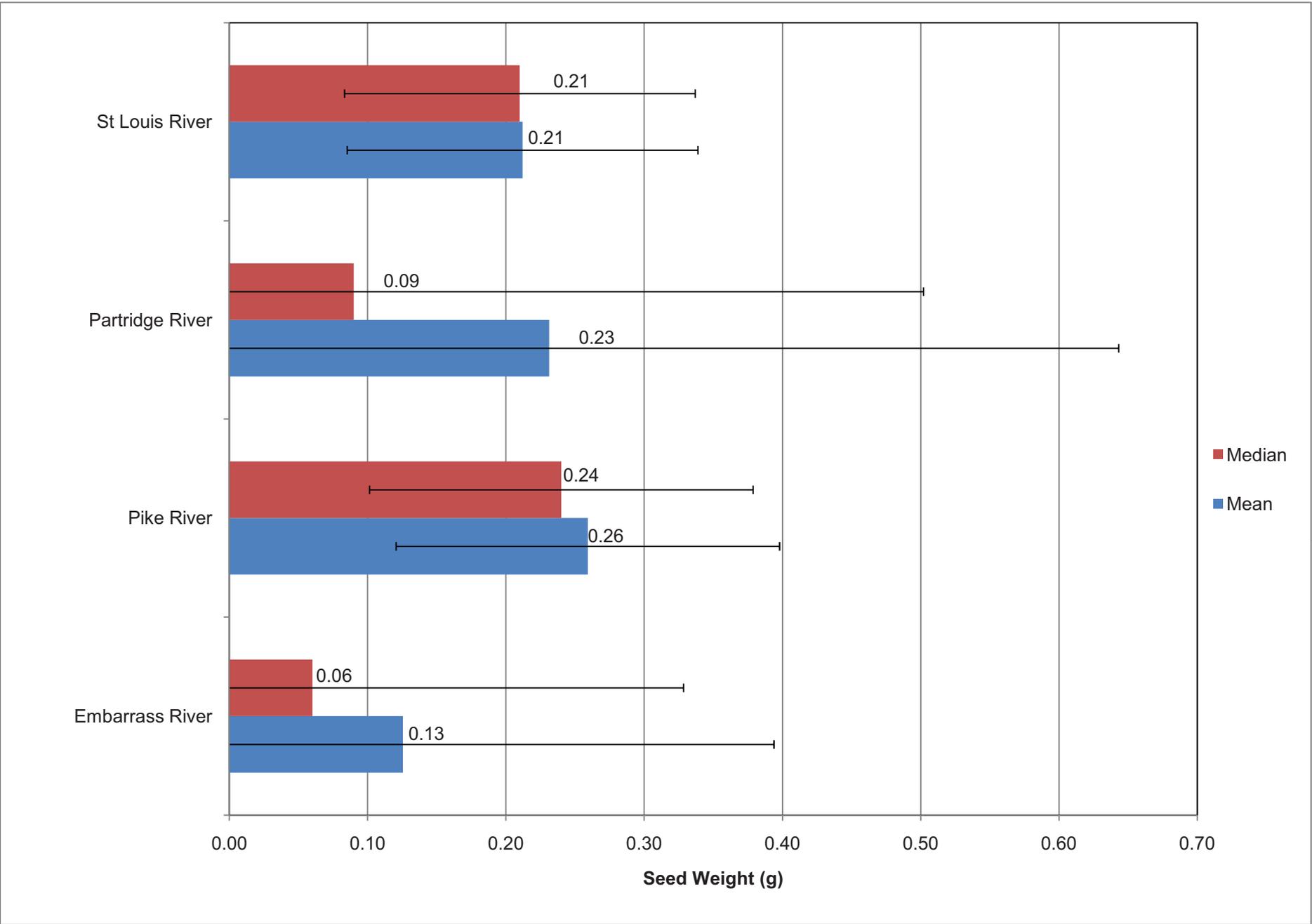
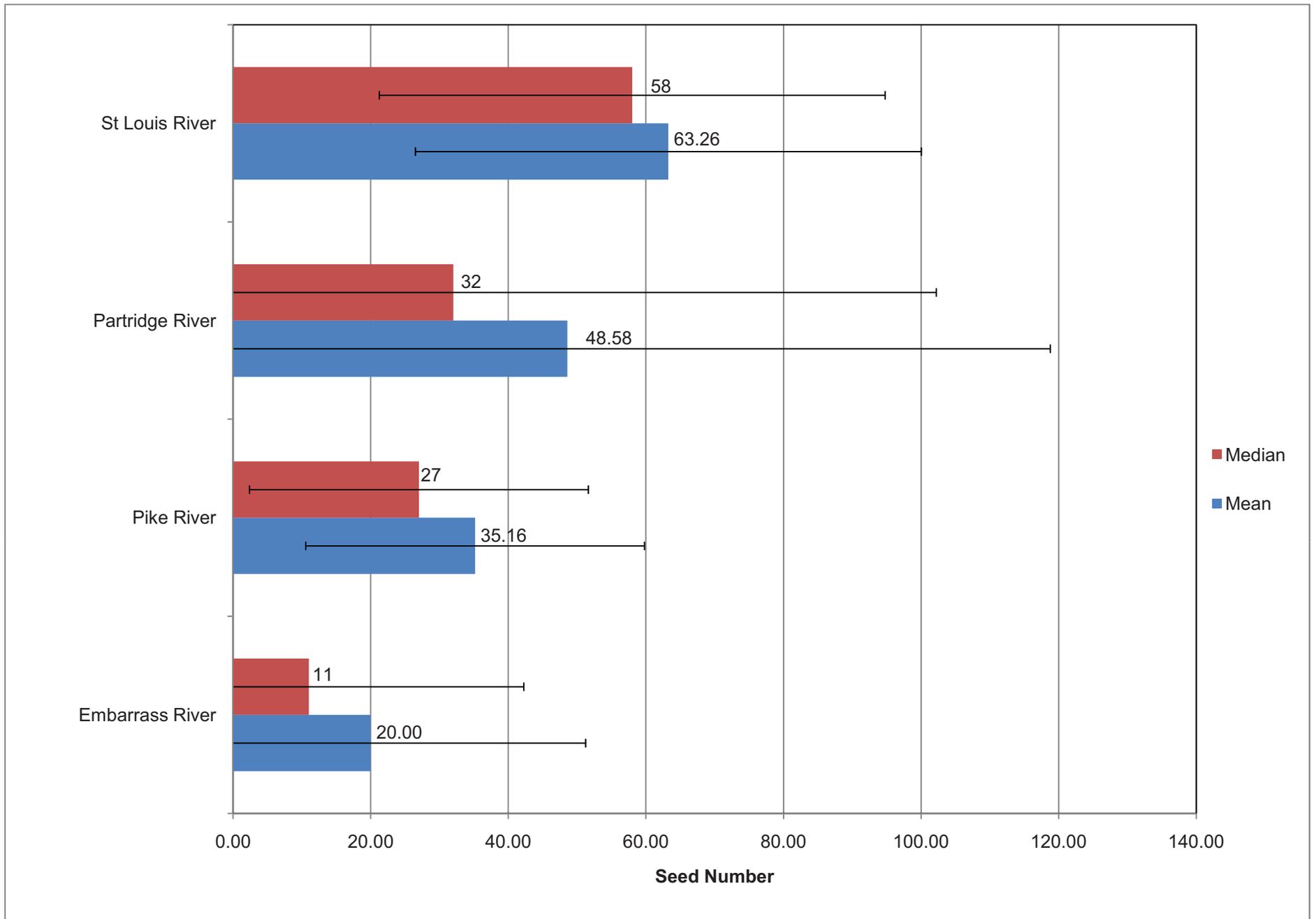
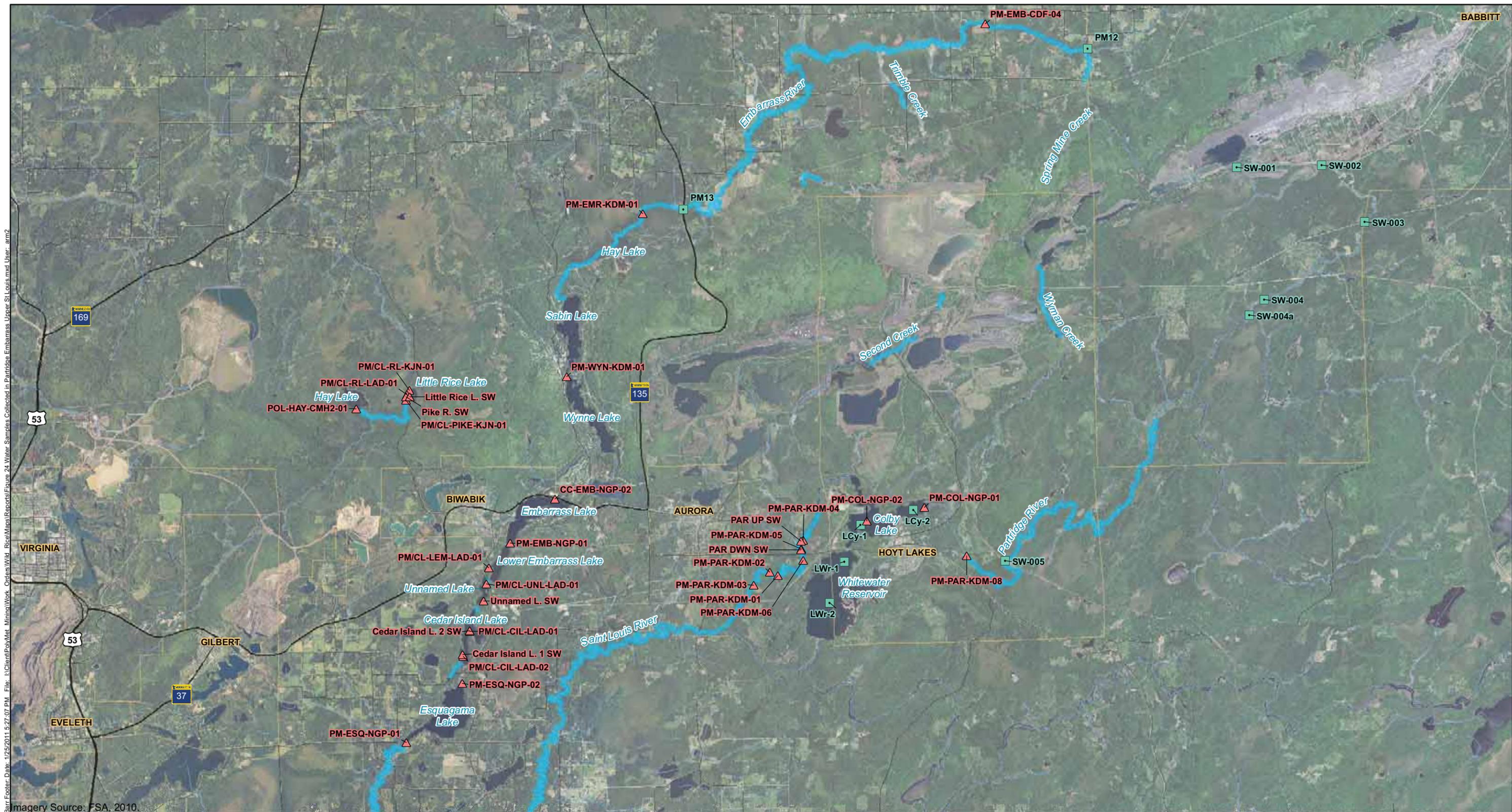


Figure 23 Median, Mean, and Standard Deviation of Seed Number in the St Louis River, Partridge River, Pike River, and Embarass River Water Bodies





File: \\Client\poly\met\mining\work\orders\wild\_rice\maps\reports\figure 24 Water Samples Collected in Partridge Embarrass Upper St. Louis.mxd User: arm2  
 Date: 1/25/2011 5:27:07 PM

imagery Source: FSA, 2010.

- ▲ Wild Rice Survey Water Sampling Location  
Sulfate Values in mg/L
- Other Surface Water Monitoring Location
- Stream Segments Surveyed in 2010
- Rivers and Streams
- City Boundaries

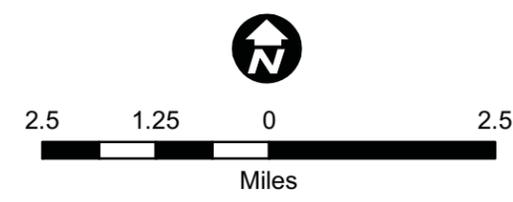
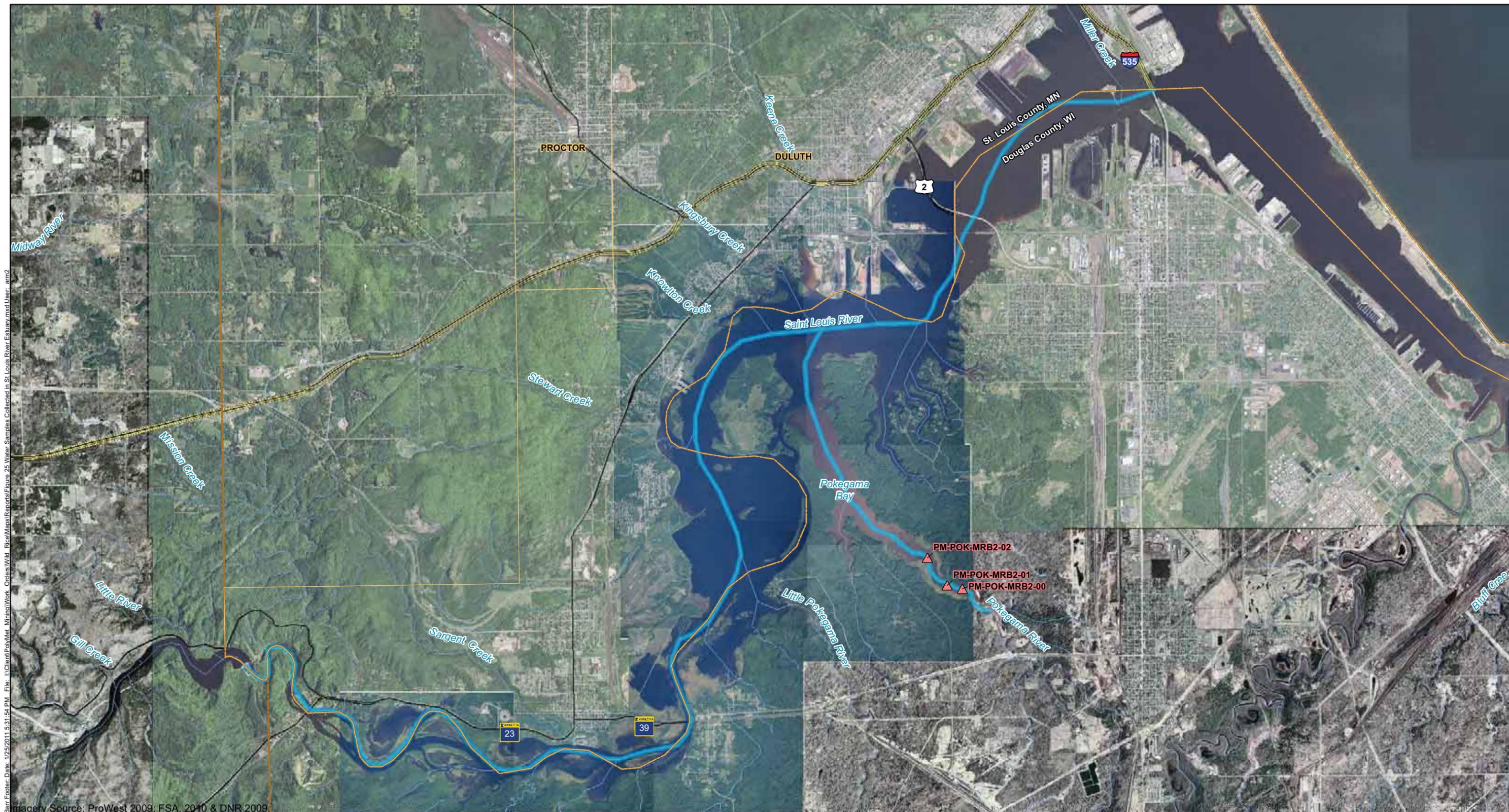


Figure 24  
 WATER SAMPLES COLLECTED IN PARTRIDGE RIVER,  
 EMBARRASS RIVER, AND UPPER ST. LOUIS RIVER  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Barr Footer Date: 1/25/2011 5:31:54 PM File: \\Client\pov\met\_minima\work\_orders\wild\_rice\maps\reports\figure 25 Water Samples Collected in St. Louis River Estuary.mxd User: arm2  
 Imagery Source: ProWest 2009; FSA, 2010 & DNR 2009

- ▲ Water Sample Locations
- Stream Segments Surveyed in 2010
- Rivers and Streams
- City Boundaries

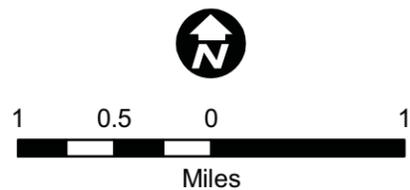
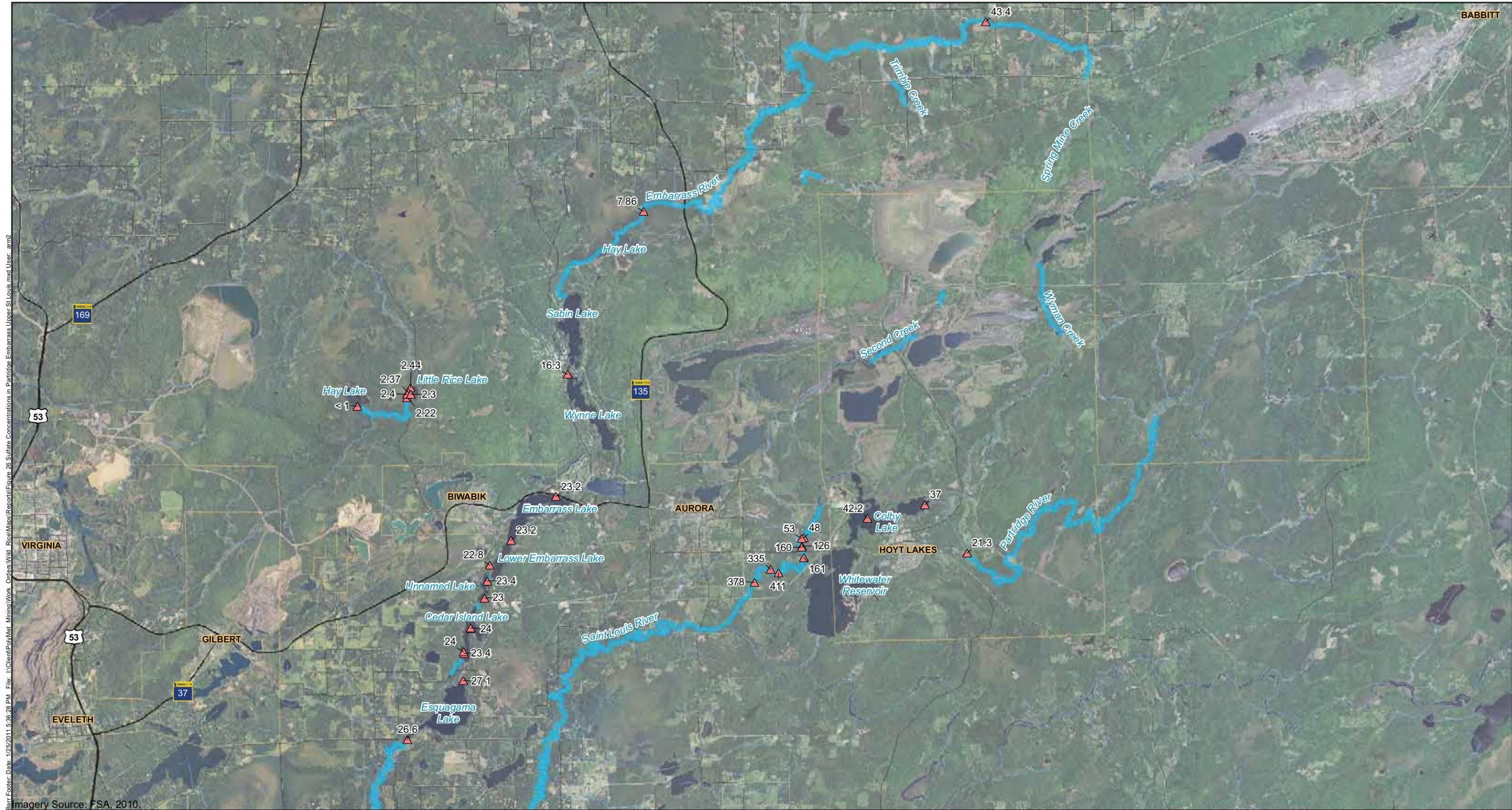


Figure 25  
 WATER SAMPLES COLLECTED IN THE  
 ST. LOUIS RIVER ESTUARY  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: \\Client\poly\met\minna\work\Orders\Wild\_Rice\Map\Reports\Figure 26 Sulfate Concentrations in Partridge Embarrass Upper St. Louis.mxd User: arm2  
 Date: 1/25/2011 5:36:28 PM  
 Imagery Source: FSA, 2010.

- ▲ Wild Rice Survey Water Sampling Location
- ▲ Sulfate Values in mg/L
- Stream Segments Surveyed in 2010
- Rivers and Streams
- City Boundaries

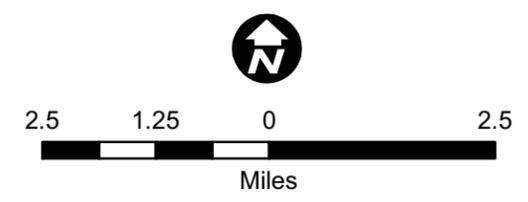


Figure 26  
 SULFATE CONCENTRATIONS IN PARTRIDGE RIVER,  
 EMBARRASS RIVER, AND UPPER ST. LOUIS RIVER  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



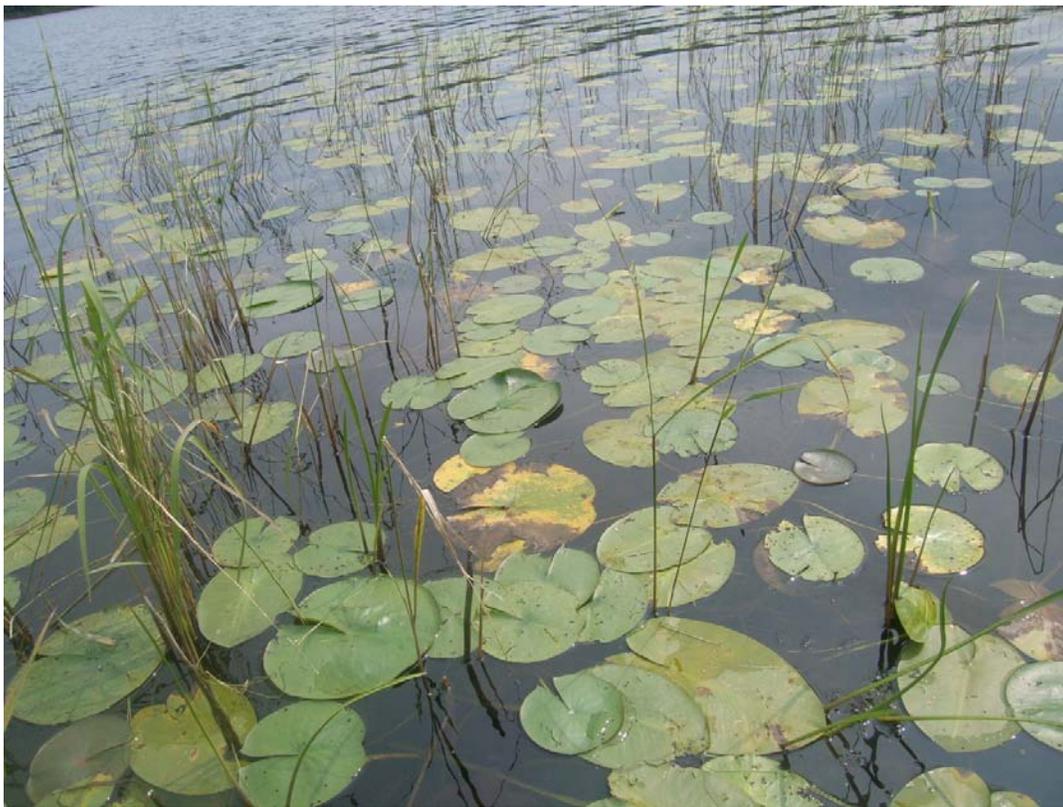
## **Appendices**

## **Appendix A**

### **Photographs of Wild Rice for the Project Study Area**



**Figure A-1 Cedar Island Lake, August 18, 2010**



**Figure A-2 Cedar Island Lake, August 18, 2010**



**Figure A-3 Little Rice Lake, August 16, 2010**



**Figure A-4 Little Rice Lake, August 16, 2010**



**Figure A-5 Lower Partridge River, August 24, 2010**



**Figure A-6 Lower Partridge River, August 26, 2010**



**Figure A-7 St. Louis River Estuary, August 19, 2010**



**Figure A-8 Pokegama Bay, August 17, 2010**



**Figure A-9 Upper Embarrass River, August 27, 2010, sparse wild rice in dense stand of *Syngonium podophyllum* (arrowhead plants)**



**Figure A-10 Upper Partridge River, August 25, 2010**



Figure A-11 St. Louis River, July 26, 2010



Figure A-12 St. Louis River, July 28, 2010



**Figure A-13 St. Louis River, July 28, 2010**

## **Appendix B**

### **Wild Rice Grid Density Calculations for the Project Study Area**

**B-1 Cedar Island Lake (Embarrass River)**

**B-2 Unnamed Lake (Embarrass River)**

**B-3 Lower Partridge River**

**B-4 Pokegama Bay (St. Louis River)**

**B-5 Little Rice Lake (Pike River)**

## **Appendix B-1**

### **Cedar Island Lake (Embarrass River)**

**Appendix B-1: Cedar Island Lake (Embarrass River)**

8/25/2009

8/25/2009

Grid 29			Grid 30		
Plots	Stems	Height	Plots	Stems	Height
Plot 90	49	42	Plot 71	61	34
		60			37
		64			54
		75			62
		43			54
Plot 60	97	70	Plot 99	48	68
		63			90
		57			77
		85			53
		61			53
Plot 98	63	65	Plot 83	73	51
		92			57
		42			46
		46			71
		89			72
Plot 59	88	68	Plot 88	45	59
		57			80
		47			94
		62			76
		76			61
Plot 94	32	44	Plot 79	84	91
		66			75
		70			81
		94			72
		100			73
Plot 38	35	32	Plot 74	23	64
		44			54
		71			48
		41			45
		57			70
Plot 76	51	45	Plot 64	84	85
		39			85
		55			79
		53			86
		70			82

**Appendix B-1: Cedar Island Lake (Embarrass River)**

8/25/2009

8/25/2009

Grid 29			Grid 30		
Plots	Stems	Height	Plots	Stems	Height
Plot 9	61	54	Plot 68	60	72
		72			63
		49			66
		56			78
		57			86
Plot 73	32	64	Plot 58	41	106
		64			71
		68			74
		92			59
		43			84
Plot 14	94	85	Plot 63	55	52
		72			74
		62			49
		69			50
		89			69
Plot 72	34	51	Plot 59	93	81
		66			76
		74			89
		91			61
		52			69
Plot 22	96	49	Plot 52	91	71
		75			92
		62			71
		55			75
		74			91
Plot 79	63	65	Plot 38	38	26
		71			64
		75			83
		81			68
		50			67
Plot 80	61	81	Plot 42	38	67
		74			68
		60			69
		91			87
		71			79

**Appendix B-1: Cedar Island Lake (Embarrass River)**

8/25/2009

8/25/2009

Grid 29			Grid 30		
Plots	Stems	Height	Plots	Stems	Height
Plot 68	26	67	Plot 29	65	80
		79			91
		60			77
		62			94
		72			63
Plot 59	53	74	Plot 23	28	66
		80			86
		79			39
		60			56
		76			54
Plot 50	21	47	Plot 10	39	71
		92			46
		65			57
		68			76
		58			69
Plot 39	54	69	Plot 4	65	52
		69			63
		51			71
		62			58
		48			70
Plot 35	52	74	Plot 97	59	71
		35			80
		68			83
		72			66
		64			86
Plot 44	14	80	Plot 68	48	76
		45			78
		45			73
		61			93
		53			92

	Stems	Height		Stems	Height
<b>Total</b>	1076	6444	<b>Total</b>	1138	6983
<b>Mean</b>	54	64.44	<b>Mean</b>	56.9	69.83
<b>Median</b>	53	64.5	<b>Median</b>	57	71
<b>S.D.</b>	25	14.71	<b>S.D.</b>	20.4319	14.94

## **Appendix B-2**

### **Unnamed Lake (Embarrass River)**

**Appendix B-2: Unnamed Lake and Lower Embarrass Lake (Embarrass River)**

8/18/2009

8/18/2009

Grid 21				Grid 22			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 1	14	0	0	Plot 1	14	29	38
5261322 N				5262472 N			
549831 E				550001 E			
Plot 41	11	240	33	Plot 11	14	24	24
5261318 N				5262471 N			
549831 E				550001 E			
Plot 72	11	89	32	Plot 22	18	20	30.5
5261315 N				5262470 N			
549832 E				550002 E			
Plot 81	9	24	28	Plot 31	15	24	34
5261314 N				5262469 N			
549831 E				550001 E			
Plot 4	11	0	0	Plot 82	14.5	11	31
5261322 N				5262464 N			
549834 E				550002 E			
Plot 5	11	0	0	Plot 92	15	10	42
5261322 N				5262463 N			
549835 E				550002 E			
Plot 14	11.5	0	0	Plot 15	21	24	21.5
5261321 N				5262471 N			
549834 E				550005 E			
Plot 45	10	27	40	Plot 55	17	21	26.5
5261318 N				5262467 N			
549835 E				550005 E			
Plot 55	10	0	0	Plot 64	16.5	11	49
5261317 N				5262466 N			
549835 E				550004 E			
Plot 95	7	0	0	Plot 73	18	4	42.5
5261313 N				5262465 N			
549835 E				550003 E			

**Appendix B-2: Unnamed Lake and Lower Embarrass Lake (Embarrass River)**

8/18/2009

8/18/2009

Grid 21				Grid 22			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 6	10	0	0	Plot 3	17.5	62	26
5261322 N				5262472 N			
549836 E				550003 E			
Plot 17	13	0	0	Plot 13	20	35	25
5261321 N				5262471 N			
549837 E				550003 E			
Plot 27	10	0	0	Plot 26	30.5	17	22
5261320 N				5262470 N			
549837 E				550006 E			
Plot 26	11	0	0	Plot 36	16.5	18	22.5
5261320 N				5262469 N			
549836 E				550006 E			
Plot 96	10	0	0	Plot 77	24	1	7
5261313 N				5262465 N			
549836 E				550007 E			
Plot 18	7.5	0	0	Plot 98	28	8	21
5261321 N				5262463 N			
549838 E				550008 E			
Plot 29	9	0	0	Plot 96	19.5	45	18.5
5261320 N				5262463 N			
549839 E				550006 E			
Plot 58	7	0	0	Plot 8	30	9	13
5261317 N				5262472 N			
549838 E				550008 E			
Plot 50	9	0	0	Plot 19	30	4	17.5
5261318 N				5262471 N			
549840 E				550009 E			
				Plot 29	32	1	6
				5262470 N			
				550009 E			

**Appendix B-2: Unnamed Lake and Lower Embarrass Lake (Embarrass River)**

8/18/2009

8/18/2009

Grid 21				Grid 22			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height

		Stems	Height			Stems	Height
<b>Total</b>		380	133	<b>Total</b>		378	517.5
<b>Mean</b>		20	7.00	<b>Mean</b>		18.9	25.88
<b>Median</b>		0	0	<b>Median</b>		17.5	24.5
<b>S.D.</b>		57.3614	14.08	<b>S.D.</b>		15.3791	11.35

## **Appendix B-3**

### **Lower Partridge River**

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 91	45	2	25	Plot 48	14	167	26	Plot 1	14.5	71	18
5263119 N				5262725 N			26	5263440 N			26
560961 E				561035 E			25	561032 E			24
							22				19
							20				26
Plot 42	29	30	24	Plot 39	12.5	169	29	Plot 52	13	113	24
5263124 N			17	5262726 N			22	5263435 N			22
560962 E			20	561036 E			23	561033 E			20
			25				25				26
							32				20
Plot 23	29	33	25	Plot 99	12	161	24	Plot 72	13	94	25
5263126 N			8	5262720 N			22	5263433 N			27
560963 E			26	561036 E			23	561033 E			19
			25				23				21
			24				29				17
Plot 53	29	80	28	Plot 70	14	63	22	Plot 73	12.5	72	23
5263123 N			23	5262723 N			26	5263433 N			25
560963 E			22	561037 E			24	561034 E			24
			23				24				26
			23				19				25

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 73	34	21	25	Plot 30	10	97	22	Plot 74	11.5	77	24
5263121 N			16	5262727 N			21	5263433 N			24
560963 E			28	561037 E			24	561035 E			25
			30				23				19
			36				21				24
Plot 74	34	88	29	Plot 20	9	108	25	Plot 64	14	80	14
5263121 N			25	5262728 N			24	5263434 N			19
560964 E			34	561037 E			21	561035 E			21
			28				20				25
			27				18				21
Plot 75	29	78	22	Plot 51	23	99	23	Plot 93	13	56	23
5263121 N			27	5262724 N			24	5263431 N			22
560965 E			31	561028 E			24	561034 E			20
			30				24				25
			32				28				27
Plot 24	28	20	27	Plot 42	21	145	22	Plot 92	12	88	20
5263126 N			22	5262725 N			20	5263431 N			24
560964 E			15	561029 E			24	561033 E			22
			23				25				26
			24				25				33

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 25	27	31	24	Plot 71	39	109	19	Plot 34	13	87	23
5263126 N			25	5262722 N			19	5263437 N			23
560965 E			16	561028 E			20	561035 E			18
			18				26				21
			20				25				28
Plot 96	31	29	16	Plot 81	37	65	24	Plot 25	13	42	31
5263119 N			23	5262721 N			19	5263438 N			24
560966 E			21	561028 E			26	561036 E			22
			24				17				19
			22				21				24
Plot 97	26	80	29	Plot 14	15	126	22	Plot 36	16	57	15
5263119 N			25	5262728 N			28	5263437 N			18
560967 E			25	561031 E			23	561037 E			18
			26				27				24
			27				29				22
Plot 78	32	33	22	Plot 34	20	114	25	Plot 37	17	34	23
5263121 N			25	5262726 N			24	5263437 N			21
560968 E			21	561031 E			24	561038 E			33
			18				30				23
			21				30				22

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 79	32	18	19	Plot 35	19	100	25	Plot 7	13.5	45	20
5263121 N			13	5262726 N			28	5263440 N			19
560969 E			19	561032 E			24	561038 E			17
			24				24				22
			19				29				28
Plot 80	28	18	25	Plot 65	19	131	26	Plot 20	20	10	22
5263121 N			25	5262723 N			22	5263439 N			18
560970 E			23	561032 E			24	561041 E			25
			23				25				25
			25				23				19
Plot 68	30.5	4	24	Plot 85	19	89	21	Plot 29	16.5	10	28
5263122 N			20	5262721 N			23	5263438 N			23
560968 E				561032 E			21	561040 E			19
							24				21
							27				20
Plot 59	21.5	39	19	Plot 16	14	49	24	Plot 49	14	168	26
5263123 N			20	5262728 N			22	5263436 N			23
560969 E			31	561033 E			24	561040 E			25
			20				29				22
			22				26				28

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 50	17.5	40	23	Plot 46	16	158	25	Plot 68	15	107	26
5263124 N			13	5262725 N			28	5263434 N			20
560970 E			18	561033 E			26	561039 E			21
			22				34				27
			25				23				27
Plot 39	19.5	32	19	Plot 77	14.5	81	21	Plot 89	18	45	24
5263125 N			27	5262722 N			23	5263432 N			19
560969 E			21	561034 E			26	561040 E			19
			22				22				27
			20				29				17
Plot 28	20.5	41	17	Plot 97	13.5	164	24	Plot 97	17	72	26
5263126 N			18	5262720 N			27	5263431 N			24
560968 E			20	561034 E			26	561038 E			24
			19				29				26
			26				26				22
Plot 10	10	72	32	Plot 68	14	150	25	Plot 100	20	69	22
5263128 N			28	5262723 N			24	5263431 N			35
560970 E			21	561035 E			22	561041 E			31
			27				23				29
			23				23				24

**Appendix B-3: Lower Partridge River (Below Colby Lake)**

8/20/2009

8/20/2009

8/21/2009

Grid 26				Grid 27				Grid 28			
Water Depth				Water Depth				Water Depth			
Plots	(in)	Stems	Height	Plots	(in)	Stems	Height	Plots	(in)	Stems	Height
		Stems	Height			Stems	Height			Stems	Height
<b>Total</b>		789	2129	<b>Total</b>		2345	2419	<b>Total</b>		1397	2307
<b>Mean</b>		39	23.14	<b>Mean</b>		117.25	24.19	<b>Mean</b>		69.85	23.07
<b>Median</b>		33	23	<b>Median</b>		111.5	24	<b>Median</b>		71.5	23
<b>S.D.</b>		26	4.72	<b>S.D.</b>		37.4656	3.05	<b>S.D.</b>		36.32	3.84

## **Appendix B-4**

### **Pokegama Bay (St. Louis River)**

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
Plot 1	57	33	142	Plot 1	62	45	168	Plot 12	60	56	138
5169514 N			128	5170023 N			145	5169572 N			139
565561 E			134	564985 E			171	565311 E			166
			112				158				138
			102				113				133
Plot 22	56	26	134	Plot 41	64	26	155	Plot 22	51	26	114
5169512 N			133	5170019 N			119	5169571 N			158
565562 E			109	564985 E			144	565311 E			119
			103				125				118
			106				107				122
Plot 91	60	31	96	Plot 51	64	12	105	Plot 41	58	86	89
5169505 N			97	5170018 N			144	5169569 N			133
565561 E			127	564985 E			139	565310 E			125
			147				109				95
			96				73				140
Plot 82	61	32	115	Plot 53	63	22	88	Plot 64	52	85	146
5169506 N			79	5170018 N			130	5169567 N			147
565562 E			98	564987 E			126	565313 E			132
			119				119				151
			82				82				108

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
Plot 84	62	23	130	Plot 43	67	14	124	Plot 53	52	61	146
5169506 N			126	5170019 N			108	5169568 N			118
565564 E			135	564987 E			123	565312 E			142
			137				111				99
			100				78				138
Plot 73	58	40	151	Plot 34	64	15	143	Plot 94	62	65	123
5169507 N			119	5170020 N			132	5169564 N			85
565563 E			34	564988 E			97	565313 E			122
			95				134				106
			121				79				102
Plot 63	63	15	112	Plot 95	57	46	147	Plot 24	65	23	131
5169508 N			119	5170014 N			108	5169571 N			120
565563 E			126	564989 E			134	565313 E			109
			113				156				110
			130				108				100
Plot 64	61	33	118	Plot 85	56	36	112	Plot 4	67	57	80
5169508 N			105	5170015 N			141	5169573 N			111
565564 E			103	564989 E			151	565313 E			100
			134				129				83
			93				127				100

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
Plot 53	62	39	115	Plot 76	57	28	151	Plot 5	55	40	103
5169509 N			151	5170016 N			136	5169573 N			130
565563 E			88	564990 E			103	565314 E			112
			92				112				121
			90				102				100
Plot 43	60	12	115	Plot 36	59	78	152	Plot 46	57	51	117
5169510 N			83	5170020 N			97	5169569 N			124
565563 E			87	564990 E			117	565315 E			146
			93				115				104
			92				142				128
Plot 22	62	15	114	Plot 25	57	45	138	Plot 66	55	53	120
5169512 N			124	5170021 N			136	5169567 N			121
565562 E			120	564989 E			124	565315 E			162
			121				131				126
			133				90				150
Plot 77	61	29	141	Plot 26	61	99	153	Plot 97	60	33	134
5169507 N			90	5170021 N			151	5169564 N			135
565567 E			111	564990 E			105	565316 E			104
			164				134				144
			153				106				131

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
Plot 56	58	43	140	Plot 6	60	28	132	Plot 8	55	58	98
5169509 N			102	5170023 N			110	5169573 N			124
565566 E			113	564990 E			100	565317 E			132
			118				89				136
			136				107				112
Plot 57	58	50	129	Plot 15	68	7	100	Plot 7	61	21	109
5169509 N			105	5170022 N			100	5169573 N			123
565567 E			91	564989 E			120	565316 E			102
			112				64				107
			113				86				114
Plot 65	62	13	140	Plot 10	59	53	139	Plot 10	62	32	88
5169508 N			117	5170023 N			122	5169573 N			108
565565 E			135	564994 E			125	565319 E			128
			79				86				125
			86				100				111
Plot 7	63	11	62	Plot 19	57	35	109	Plot 30	56	83	128
5169514 N			99	5170022 N			108	5169571 N			131
565567 E			75	564993 E			134	565319 E			137
			84				112				129
			83				112				78

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
Plot 58	58	53	106	Plot 40	56	59	137	Plot 40	53	51	125
5169509 N			104	5170020 N			107	5169570 N			149
565568 E			104	564994 E			128	565319 E			126
			128				128				165
			109				82				100
Plot 19	62	11	100	Plot 39	61	22	169	Plot 50	63	86	134
5169513 N			70	5170020 N			110	5169569 N			115
565569 E			70	564993 E			150	565319 E			144
			68				110				119
			58				112				111
Plot 10	63	13	93	Plot 60	57	54	158	Plot 80	59	75	130
5169514 N			124	5170018 N			175	5169566 N			126
565570 E			83	564994 E			117	565319 E			142
			78				140				109
			78				111				110
Plot 50	58	45	130	Plot 99	54	68	111	Plot 100	52	30	145
5169510 N			84	5170014 N			98	5169564 N			134
565570 E			82	564993 E			155	565319 E			115
			116				106				133
			109				135				121

**Appendix B-4: Pokegama Bay (St. Louis River)**

9/8/2009

9/8/2009

9/8/2009

Grid 90				Grid 91				Grid 92			
Plots	Water Depth (cm)	Stems	Height (cm)	Plots	Water Depth (cm)	Stems	Height	Plots	Water Depth (cm)	Stems	Height
<b>Total</b>		567	10850	<b>Total</b>		792	12151	<b>Total</b>		1072	12221
<b>Mean</b>		28	108.50	<b>Mean</b>		39.6	121.51	<b>Mean</b>		53.6	122.21
<b>Median</b>		30	110	<b>Median</b>		35.5	119.5	<b>Median</b>		54.5	123
<b>S.D.</b>		14	23.52	<b>S.D.</b>		23.913	23.46	<b>S.D.</b>		21.81	18.72

## **Appendix B-5**

### **Little Rice Lake (Pike River)**

**Appendix B-5: Little Rice Lake (Pike River)**

8/18/2009

8/18/2009

Grid 19				Grid 20			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 42	23	147	39	Plot 12	31	40	39.5
5268482 N				5268671 N			
547970 E				547222 E			
Plot 51	23	125	37	Plot 42	29	57	39
5268481 N				5268668 N			
547969 E				547222 E			
Plot 61	24	168	44	Plot 41	29	78	46
5268480 N				5268668 N			
547969 E				547221 E			
Plot 82	23	109	41	Plot 51	35	53	44.5
5268478 N				5268667 N			
547970 E				547221 E			
Plot 74	25	101	39	Plot 52	29	69	36
5268479 N				5268667 N			
547972 E				547222 E			
Plot 63	24	94	38	Plot 83	31	4	29
5268480 N				5268664 N			
547971 E				547223 E			
Plot 54	26	70	31	Plot 6	30	37	28
5268481 N				5268672 N			
547972 E				547226 E			
Plot 4	23	83	35	Plot 45	31	52	31
5268486 N				5268668 N			
547972 E				547225 E			

**Appendix B-5: Little Rice Lake (Pike River)**

8/18/2009

8/18/2009

Grid 19				Grid 20			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 16	26	51	33	Plot 56	31	13	36
5268485 N				5268667 N			
547974 E				547226 E			
Plot 57	24	124	47	Plot 8	31.5	17	38
5268481 N				5268672 N			
547975 E				547228 E			
Plot 67	24	124	41	Plot 18	32	20	29.5
5268480 N				5268671 N			
547975 E				547228 E			
Plot 87	29	68	42	Plot 28	30	32	39
5268478 N				5268670 N			
547975 E				547228 E			
Plot 86	24	178	35	Plot 57	32	10	34
5268478 N				5268667 N			
547974 E				547227 E			
Plot 49	24	106	33	Plot 78	33	23	41
5268482 N				5268665 N			
547977 E				547228 E			
Plot 39	26	93	38	Plot 77	31	16	37
5268483 N				5268665 N			
547977 E				547227 E			
Plot 18	24	51	30	Plot 98	32.5	20	43
5268485 N				5268663 N			
547976 E				547228 E			
Plot 8	24	104	41	Plot 100	33	22	33
5268486 N				5268663 N			
547976 E				547230 E			

**Appendix B-5: Little Rice Lake (Pike River)**

8/18/2009

8/18/2009

Grid 19				Grid 20			
Plots	Water Depth (in)	Stems	Height	Plots	Water Depth (in)	Stems	Height
Plot 30	23	99	39	Plot 89	34	16	29
5268484 N				5268664 N			
547978 E				547229 E			
Plot 45	24	179	43	Plot 79	34	41	40
5268482 N				5268665 N			
547973 E				547229 E			
Plot 95	29	119	41	Plot 59	33	9	33
5268477 N				5268667 N			
547973 E				547229 E			

	Stems	Height		Stems	Height
<b>Total</b>	2193	767	<b>Total</b>	629	725.5
<b>Mean</b>	110	38.35	<b>Mean</b>	31.45	36.28
<b>Median</b>	105	39	<b>Median</b>	22.5	36.5
<b>S.D.</b>	37	4.45	<b>S.D.</b>	21.1249	5.37

## **Appendix C**

### **2010 Wild Rice Management Workgroup's "350 Significant Wild Rice Waters in Minnesota"**

### 350 Significant Wild Rice Waters in Minnesota

This is a list of 350 of the most important wild rice waters in Minnesota based on harvest, ecological, and/or cultural and historical values. Please note that all waters supporting wild rice are important, and a complete inventory of these waters in Minnesota is also maintained. The complete list of wild rice waters should be consulted when appropriate (considerations for zoning, surface water use, water quality and quantity, etc.). This list was compiled by the Wild Rice Management Workgroup, a coalition of federal, state, and tribal resource managers and other wild rice stakeholders. This list may be updated in the future as needed by the Workgroup. *list updated 5/4/2010*

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	DNR/DU	Managed by	Wildlife coverage	NatAn	harvest potential	harvest pressure	harvest access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments
Aitkin	White Elk	01014800	780	350	1	M	MNDNR - Wildlife/DU	Rice thickest in south half of lake, band around north side.	MLIR	fair	low	easy		WLM	VC		Federal	USFWS		Rice thickest in south half of lake, band around north side.
Aitkin	Rice	01006700	3,635	1,700	0		USFWS - Rice Lake NWR	Rice is located in varying degrees across entire basin.		permit only	low	easy		WLM	VC		Federal	USFWS		Rice is located in varying degrees across entire basin.
Aitkin	Flowage	01006100	720	432	140		USACOE - Sandy Lake RA	Can include almost complete coverage of south half of lake,		good	moderate	easy		WLM	VC		Federal	USACOE		Can include almost complete coverage of south half of
Aitkin	Mallard	01014900	354	320	185	A	MNDNR - Wildlife	Rice can cover almost all open water in basin, some holes in		good	high	easy		BDR	NatOut					Rice can cover almost all open water in basin, some holes in
Aitkin	Aitkin	01004000	850	298	11		USACOE - Sandy Lake RA	Around shoreline and outlet.		fair	low	fair		WLM	VC		Federal	USACOE		Around shoreline and outlet.
Aitkin	Shovel	01020000	230	207	36	M	MNDNR - Wildlife/DU	Rice can cover almost entire open water area of basin.		fair	moderate	fair		BDR	NatOut					Rice can cover almost entire open water area of basin.
Aitkin	Sandy River Lake	01006000	368	200	48		USACOE - Sandy Lake RA			fair	moderate	easy		WLM	VC		Federal	USACOE		
Aitkin	Minnewawa	01003300	2,451	130	24			Rice east and northwest portions of the lake.		fair	moderate	fair		WLM	FC		State	MNDNR - Waters		Rice east and northwest portions of the lake.
Aitkin	Twenty	01008500	153	119	53	M	MNDNR - Wildlife/DU	Rice can cover almost entire open water area of basin.		fair	moderate	easy		BDR	NatOut					Rice can cover almost entire open water area of basin.
Aitkin	Moose	01014000	148	117	77	A		Rice can cover almost entire open water area of basin.		good	moderate	easy			NatOut					Rice can cover almost entire open water area of basin.
Aitkin	Rat House	01005300	122	100	2	M	MNDNR - Wildlife/DU	Rice can cover almost entire open water area of basin.		fair	low	fair			NatOut					Rice can cover almost entire open water area of basin.
Aitkin	Big Sandy	01006200	9,380	94	98		USACOE - Sandy Lake RA	Primarily in the Prairie River inlet flowage to lake.		fair	low	easy		WLM	VC		Unknown	USACOE		Primarily in the Prairie River inlet flowage to lake.
Aitkin	Moose River Pool	01035800	900	89			MNDNR - Wildlife			closed				WLM	VC					Wild rice density is moderate (3), and its condition was goo
Aitkin	Spruce	01015100	80	80				entire lake			difficul									entire lake
Aitkin	Newstrom	01009700	97	76	5	M	MNDNR - Wildlife/DU	Rice can cover almost entire open water area of basin.		fair	low	easy		BDR	NatOut					Rice can cover almost entire open water area of basin.
Aitkin	Salo Marsh State WMA Imp.	01041500	690	76			MNDNR - Wildlife			closed				WLM	VC					Wild rice density is lush (4), and its condition was excelle
Aitkin	Mud	01019400	135	68		A	MNDNR - Wildlife	Around shoreline of basin.				difficul		BDR	NatOut					Around shoreline of basin.
Aitkin	Gun	01009900	735	60				NE bay.			easy				C					NE bay.
Aitkin	Section Ten	01011500	440	52	1	M					easy									Wild rice density is lush (4), and its condition was excelle
Aitkin	Ripple	01014600	676	50	6			Located on east and west ends of lake, also acres on Ripple		fair	low	easy			VC					Located on east and west ends of lake, also acres on Ripple
Aitkin	Rock	01007200	366	50							easy									
Aitkin	Moose Willow WMA - Willow Pt	01043100	300	50			MNDNR - Wildlife			closed				WLM	VC		State	MNDNR - Wildlife		
Aitkin	Unnamed - Little Willow River V	01033200	140	50		M	MNDNR - Wildlife			closed				WLM	VC					Wild rice density is scattered (2), and its condition was fa
Aitkin	Rice	01000500	83	50		M	MNDNR - Wildlife					difficul		BDR	NatOut	BPL	Private	Private		
Aitkin	Waukenabo	01013600	819	49				Entire lake				easy			VC		State	MNDNR - Waters		Entire lake
Aitkin	Rat	01007700	442	45	2			Largest stand in the NE.				easy			NatOut					Largest stand in the NE.
Aitkin	Elm Island	01012300	656	30	12			Primarily around inlet and outlet.		fair	low	easy			NatOut					Primarily around inlet and outlet.
Aitkin	Sjodin	01031600	43	28	6			Most of lake except center				easy			NatOut					Most of lake except center
Aitkin	Red	01010700	97	4	6			Around shore				easy								Around shore
Aitkin	Section Twelve	01012000	167	1	5			SE and NE edges.				easy								SE and NE edges.
Aitkin	Prairie River	01r6		34																
Aitkin	Ripple River	01r3		12																
Anoka	Carlos Avery WMA - Pool 9	W9001009	269	120			MNDNR - Wildlife							WLM	VC	DI	State	MNDNR		
Anoka	Carlos Avery WMA - Pool 3	W9001003	186	120			MNDNR - Wildlife							WLM	VC	DI	State	MNDNR		
Anoka	Hickey	02009600	41	5							low		added from state harvester survey.							
Becker	Big Basswood	03009600	586	304	6	M	R-WE		WEIR	good	low	easy					Tribal	R - WE		
Becker	Chippewa	03019600	960	288	1		USFWS - Tamarac NWR			good	high	fair		WLM	VC		Federal	USFWS - Tamarack NWR		
Becker	Tamarack	03024100	2,227	245			USFWS - Tamarac NWR/WE			poor	low	easy		BDR	C		Federal	USFWS - Tamarack NWR		
Becker	Rice	03020100	245	245			USFWS - Tamarac NWR/WE			good	high	easy			VC		Federal	USFWS - Tamarack NWR		
Becker	Rock	03029300	1,198	240			R-WE				low									
Becker	Little Flat	03021700	235	211			USFWS - Tamarac NWR/WE		WEIR	good	high	fair			NatOut		Federal	USFWS - Tamarack NWR		
Becker	Height Of Land	03019500	3,943	197	22					fair	moderate	easy			FC		State	MNDNR - Waters		
Becker	Flat	03024200	1,970	197	6		USFWS - Tamarac NWR/WE			good	high	fair		WLM	FC		Federal	USFWS - Tamarack NWR		
Becker	Rice	03029100	245	196		M					low									
Becker	Shell	03010200	3,147	169	11	M				fair	moderate	easy			VC		Private	Bob Merritt - DL		
Becker	Hubbel Pond	03024000	561	168	2	M				fair	moderate	easy			Unknown		State	MNDNR		
Becker	Spindler	03021400	185	125			USFWS - Tamarac NWR/WE		WEIR	good	high	easy		BDR	NatOut		Federal	USFWS - Tamarack NWR		
Becker	Big Rat	03024600	1,102	110			R-WE		WEIR	fair	moderate	easy								
Becker	Buffalo	03035000	444	89	1		R-WE	Includes wild rice on Buffalo River.							Unknown		Federal	USFWS - Tamarack NWR		Includes wild rice on Buffalo River.
Becker	Mud	03006700	88	83									1996 data							
Becker	Schultz	03027800	103	82		M							Beaver MGD							
Becker	Abners	03003900	100	80		M	MNDNR - Wildlife/DU			good	moderate	fair		BDR						
Becker	Lower Egg	03021000	171	75	9		USFWS - Tamarac NWR/WE		WEIR	good	moderate	fair		BDR	NatOut		Federal	USFWS - Tamarack NWR		
Becker	Trieglaff	03026300	111	56																
Becker	Winter	03021600	117	43			USFWS - Tamarac NWR/WE		WEIR	fair	moderate	easy		WLM	VC		Federal	USFWS - Tamarack NWR		
Becker	Booth	03019800	48	43			USFWS - Tamarac NWR/WE			fair	low	fair		BDR	NatOut		Federal	USFWS - Tamarack NWR		
Becker	Blackbird	03019700	284	42	4		USFWS - Tamarac NWR/WE			good	high	easy			NatOut		Federal	USFWS - Tamarack NWR		
Becker	Mud	03002300	85	42			Private				low			BDR						
Becker	Two Inlets	03001700	643	40	1		Private			fair	low	easy	1995 data	BDR	FC		State	MNDNR		
Becker	Johnson	03019900	181	40			USFWS - Tamarac NWR/WE			poor	low	easy			NatOut		Federal	USFWS - Tamarack NWR		
Becker	Bush	03021200	110	40			USFWS - Tamarac NWR/WE		WEIR	good	high	easy		WLM	VC		Federal	USFWS - Tamarack NWR		

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	DNR/DU Managed by	Wildlife coverage	NatAm	harvest potential	harvest pressure	harvest access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments
Becker	Little Basswood	03009200	105	31	5	R-WE		WEIR		low	easy					Tribal	R - WE		
Becker	Carman	03020900	217	30	14	USFWS - Tamarack NWR/WE		WEIR	fair	moderate	fair		BDR	FC		Federal	USFWS - Tamarack NWR		
Becker	Upper Egg	03020600	493	24	10	USFWS - Tamarack NWR/WE		WEIR	poor	low	fair			NatOut		Federal	USFWS - Tamarack NWR		
Becker	Cabin	03034600	38		10	R-WE		WEIR		moderate									
Becker	Little Round	03030200	565		7	A R-WE				low									
Becker	Unnamed (Indian Creek impoun	03078600	13		7	M R-WE			fair	moderate	easy				VC				
Beltrami	Big	04004900	3,565	250		R-LL/MNDNR - Fisheries	NW & W bays.	LLIR	fair	low	easy		BDR	NatOut					NW & W bays.
Beltrami	Puposky	04019800	2,120	236		M			poor	low	fair								
Beltrami	Rabideau	04003400	723	217	33	M				high	easy			FC	Old	Federal	USFWS		
Beltrami	Bootleg	04021100	308	185	8				poor	low	fair			NatOut					
Beltrami	Kitchi	04000700	1,850	185		R-LL	Creek to Little Rice.	LLIR	poor	low	fair			NatOut					Creek to Little Rice.
Beltrami	Manomin	04028600	288	144	13	M MNDNR - Wildlife			good	moderate	fair		BDR	NatOut					
Beltrami	Pimushe	04003200	1,350	135	1	M	NW bay.	LLIR		low	fair					County	Co. Park		NW bay.
Beltrami	Three Island	04013400	836	125	2					low	easy			FC					
Beltrami	Rice Pond	04005900	247	123		M MNDNR - Wildlife			good	easy		Within Rice Pond State Waterfowl Refuge.	BDR	NatOut					
Beltrami	Burns	04000100	131	105		R-LL		LLIR	poor	low	difficul			NatOut					
Beltrami	Irving	04014000	644	97			NW bay.			fair				NatOut					NW bay.
Beltrami	Big Rice	04003100	642	96		R-LL		LLIR	good	moderate	difficul			NatOut					
Beltrami	Moose	04001100	617	96		R-LL	N. & SW bays.	LLIR	poor	low	fair			NatOut					N. & SW bays.
Beltrami	Little Puposky	04019700	158	95		M				easy				NatOut					
Beltrami	Medicine	04012200	458	69		M	SW bay.			fair									SW bay.
Beltrami	Little Rice	04001500	123	60		R-LL	Around shoreline and inlet/outlet.	LLIR	good	low	difficul	added from lcmr.shp							Around shoreline and inlet/outlet.
Beltrami	Erickson	04006800	111	50						difficul					NatOut				
Beltrami	Cranberry	04012300	77	46	1	M				low		Early 80's data		NatOut					
Beltrami	Turtle River	04011100	1,664		15					moderate		No rice known to occur on lake, rice only in river.							
Carlton	Long	9006600					rice along shore, thick in inlet and NW portion												
Carlton	Tamarack River						good stands in several stretches												
Carlton	Perch	09003600	796	597		R-FDL		1854, FDLIR				1997 data	BDR, D	VC		Tribal	R - FDL		
Carlton	Kettle	09004900	611	415	8	M MNDNR - Wildlife		1854	good	moderate	easy			BDR, BR					surveyed annually by 1854 Treaty Authority
Carlton	Miller	09005300	156	156		R-FDL		1854, FDLIR		high				BDR					
Carlton	Rice Portage	09003700	832	120	1	R-FDL		1854, FDLIR		high		100 acres of open water (75% rice) 1987: 75%, 1997: 50%. History of beaver problems - plugged	BDR, D	VC		Tribal	R - FDL		
Carlton	Dead Fish	09005100	153	115	5	R-FDL		1854, FDLIR		high				Unknown		Tribal	R - FDL		
Carlton	Jaskari	09005000	74	74		R-FDL		1854, FDLIR		high			BDR, D			Tribal	R - FDL		
Carlton	Moose Horn River	09r1	123	61	11		wide slow section of river extending from Moose Lake into Pine County												
Carlton	Tamarack	09006700	228.0	59.0							1997 data, 2009 Survey								
Carlton	Island	09006000	456	46	7					low		1997 data: 10% of Lower Island Lake							
Carlton	Tamarack Lake	9006700	228				stands in narrows and in river												
Carlton	Hay	9001000	215				rice along shore, some denser areas/bays												
Carlton	Wild Rice	9002300				Fond du Lac Reservation	sparse rice over most of lake												
Carlton	Little Kettle	9007700					can have good stands over about three-fourths of lake												
Cass	Leech	11020300	109,415	4,000	27	USACOE - Leech Lake RA	Bear I.; Blackduck & Grassy Pts; Boy, Federa Dam & Headquart	R-LL	good	high	easy		WLM	VC	USACOE dam	Federal	USACOE		Bear I.; Blackduck & Grassy Pts; Boy, Federa Dam & Headquart
Cass	Big Rice	11007300	2,717	1,411	10	M MNDNR - Wildlife/DU	Historic coverage of approx. 60%, best stands along north an		fair	moderate	easy	State Waterfowl Feeding and Resting Area.	BDR, BR	FC	Stoplogs	State	MNDNR		Historic coverage of approx. 60%, best stands along north an
Cass	Mud	11010000	1,440	1,300	35	MNDNR - Wildlife	Found over extensive areas of the lake.	LLIR	good	high	easy	Within Mud-Goose State WMA.	WLM	VC		State	MNDNR		Found over extensive areas of the lake.
Cass	Winnibigoshish	11014700	69,821	1,000	24	USACOE - Winnibigoshish L. RA	Third River flowage (500 acres), Raven flowage (450 acres),	LLIR	fair	high	easy		WLM	VC	Sliding grate	Federal	USACOE		Third River flowage (500 acres), Raven flowage (450 acres),
Cass	Laura	11010400	1,424	854	9	M MNDNR - Wildlife/DU	Northern 2/3rds of main lake and east, south bays.			moderate			BDR	NatOut					Northern 2/3rds of main lake and east, south bays.
Cass	Goose	11009600	844	844	7	MNDNR - Wildlife	In good years, almost 100% coverage of open water area.		good	moderate	easy	Within Mud-Goose State WMA, water levels managed by dam on M	BDR	VC	Sliding grate	State	MNDNR		In good years, almost 100% coverage of open water area.
Cass	Boy	11014300	5,544	340	3	R-LL		LLIR	good	high	easy			NatOut					Fairly continuous coverage in north bay and in a band along
Cass	George	11010100	720	262	3	M MNDNR - Wildlife/DU	Fairly continuous coverage in north bay and in a band along		poor	low	easy		BDR	VC		State	MNDNR - Waters		
Cass	Lomish	11013600	282	197		R-LL		LLIR	good	moderate	easy		BDR	NatOut					
Cass	Rice	11016200	342	137					good	moderate	easy	1997 data							
Cass	Gull River	11r1	219	110	5	Industrial - MN Power	It was found along the river channel throughout the surveyed		fair	low	fair				VC	Industrial	Industrial - MN Power		There were several very thick stands of Rice although most a
Cass	Rice (Pillager)	11032100	232	100	12	A MNDNR - Wildlife/Private	Wild rice stands can occupy up to 80% of basin area.		fair	moderate	difficul		BDR	NatOut		Private	Private		It was found along the river channel throughout the surveyed
Cass	Lind (Lindsey)	11036700	462	95	18				fair	moderate	easy			NatOut					Wild rice stands can occupy up to 80% of basin area.
Cass	McCarthy	11016800	194	78		Private			fair	low	difficul	1994 data only current public access is Potlatch land on SW corner of	BDR			Private	see Ray file		
Cass	Farnham	11051300	142	71	8	M MNDNR - Wildlife	25% in an average year to 100% in a good year.	LLIR	fair	low	easy		BDR	NatOut		Private		typically moderate	25% in an average year to 100% in a good year.
Cass	Six Mile	11014600	1,288	70		USFS			poor	low	fair		WLM	VC	FC	State	MNDNR - Waters		
Cass	Washburn	11005900	1,768	60						moderate	easy	1996 data							
Cass	Brockway	11036600	182	55	14				good	moderate	easy	1996 data Latern Bay, Broud Water, Narrows, Dam on Girl Lake, Otter Ba				Unknown			
Cass	Woman	11020100	5,360	54	2	M			fair	low	easy				FC				
Cass	Swift	11013300	359	51										NatOut					
Cass	Chub	11051700	57	51		R-LL		LLIR	good	moderate	easy	Within Mud-Goose State WMA.			NatOut		Federal	USFWS	
Cass	Twin	11012300	297	50		M MNDNR - Wildlife/DU				difficul			BDR	C					
Cass	Lower Hand	11025100	122	50		M MNDNR - Wildlife	Center and eastern portions of basin, lily pads dominated we		poor	low	difficul	Added to MNDNR Brainerd's management list in 2007.	BDR	NatOut		County		moderate in 2007	Center and eastern portions of basin, lily pads dominated we
Cass	Lizotte	11023100	75	50		MNDNR - Wildlife	Wild rice can over a majority of basin in a good year.		fair	low	fair		BDR	NatOut					Wild rice can over a majority of basin in a good year.
Cass	Rice (Carroll's)	11022700	46	46			Wild rice can completely cover open water portion of basin.					Privately managed wild rice bed.							Wild rice can completely cover open water portion of basin.
Cass	Big Birch	11001700	255	45		M ?								NatOut					
Cass	Pine Mountain	11041100	1,657	40					fair	low	easy								Fair band along shoreline.
Cass	Hattie	11023200	592	40															
Cass	Beuber	11035300	135	15	14				fair	moderate	easy	1997 Data: 150 ft fringe of rice all around							
Cass	Island	11010200	390	10	8		In various bays.											scarce	In various bays.

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	DNR/DU	Managed by	Wildlife coverage	NatAm	harvest potential	harvest pressure	harvest access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments
Cass	Drumbeater	11014500	376	5	11		MNDNR - Wildlife/R-LL		LLIR	poor	low	difficul	State Waterfowl Refuge.	BDR	NatOut					
Cass	Moose	11042400	92	1	5			Practically no rice present.			low				NatOut					Practically no rice present.
Cass	Portage	11047600	277		5															
Clearwater	Lower Rice	15013000	2,375	1,568	44		R-WE		WEIR	good	high		Good regular producer		VC		Tribal	R - WE		
Clearwater	Upper Rice	15005900	1,860	1,116	25	M	MNDNR - Wildlife/WE				high	easy	Adjacent to Upper Rice Lake State WMA.		VC	Double log	State	MNDNR - Wildlife		
Clearwater	Pine	15014900	1,465	220			Red Lake Watershed District					easy	Adjacent to Pine Lake State WMA.		VC		State	MNDNR - Fisheries		
Clearwater	Mud	15006100	294	103	17	M		wide band of rice around most of lake except pars of the wes			moderate	easy	Adjacent to Mud Lake State WMA. Potential for management, ol							wide band of rice around most of lake except pars of the wes
Clearwater	Unnamed	15002100	150	45		M						difficul								
Clearwater	Minerva	15007900	239	36	13	A	R-WE				moderate	easy								
Clearwater	Sucker	15002000	90	14	7						low	easy	Adjacent to Sucker Lake State WMA.							
Clearwater	Clearwater River	15r1			15						moderate									
Cook	Marsh	16048800	69					52 acres in 1998, less in 99-01, typically sparse to fair coverage												
Cook	Swamp River	16090100	165	153	1				1854	good	low	easy			C		State	State		
Cook	Northern Light	16008900	443	133			USFS		1854	fair		easy			FC		Federal	USFS		
Cook	Elbow	16009600	415	124	5				1854	fair	low	easy								
Cook	Rice	16045300	230	92	1				1854	fair	low	fair	1997: 92 acres (40%), normally 20% as in 1998.				Federal	USFS - BWCA		
Cook	Kelly	16047600	188	56					1854	poor		difficul	1997 data: very consistent in rice production - really spars							
Cook	Moore	16048900	64	48					1854	poor		easy								
Cook	Fourmile	16063900	593	42	2				1854	fair	low	easy								
Cook	Mark	16025000	140					can have good rice over most of lake, used by harvesters												
Cook	South Fowl	16003400	1,440					moderate to dense patches of rice												
Cook	North Fowl	16003600	1,020					moderate to dense patches of rice												
Crow Wing	Lower Dean	18018100	372	360	62	M	MNDNR - Wildlife	Wild rice can completely cover basin.		good	high	easy	Lake adjacent to Lower Dean State WMA.	BDR	NatOut		State	MNDNR - Waters		Wild rice can completely cover basin.
Crow Wing	Platte	18008800	1,768	350	1	A	MNDNR - Waters	Wild rice located in NW bay, around shoreline.		poor	low	easy		WLM	FC		State			Wild rice located in NW bay, around shoreline.
Crow Wing	Duck	18017800	310	175	3	M	MNDNR - Wildlife	Wild rice can completely cover open water portion of basin (		fair	low	easy	Lake within Duck Lake State WMA.	WLM	VC		State	MNDNR - Wildlife		Wild rice can completely cover open water portion of basin (
Crow Wing	Rice (Deerwood)	18006800	185	170	7	A	MNDNR - Wildlife	Wild rice densest in northern 2/3rds of basin, around shore		fair	moderate	easy		BDR	C		County	County		Wild rice densest in northern 2/3rds of basin, around shore
Crow Wing	Rice (Hesitation WMA)	18005300	168	138	10	M	MNDNR - Wildlife/DU	Wild rice densest in western 2/3rds of basin.		fair	moderate	easy	Lake within Hesitation State WMA.	WLM	FC		State	MNDNR - Fisheries		Wild rice densest in western 2/3rds of basin.
Crow Wing	Rice (Clark Lake)	18032700	181	124		M	MNDNR - Wildlife/DU	Wild rice can completely cover basin, open in the middle.		fair	low	fair		BDR	C		County	Co. DOT		Wild rice can completely cover basin, open in the middle.
Crow Wing	Lizzie	18041600	384	100	17			Wild rice located around east, north and outlet portion of b			low			?	FC		State	MNDNR - Waters		Wild rice located around east, north and outlet portion of b
Crow Wing	Garden	18032900	262	100	1	M	MNDNR - Wildlife/DU	Wild rice densest along east shore and north bay.		poor	low	easy		BDR	C		State	Co. DOT		Wild rice densest along east shore and north bay.
Crow Wing	Nelson	18016400	323	100				Wild rice located in west half of lake.		poor	low	fair		NA	NatOut		State			Wild rice located in west half of lake.
Crow Wing	Hole-in-the-Day	18040100	217	90			MNDNR - Wildlife	Wild rice is densest in northern 2/3rds of basin.		fair	low	easy	Within City of Nisswa wildlife refuge.	BDR	C		County	MNDOT		Wild rice is densest in northern 2/3rds of basin.
Crow Wing	Rice (Pratt's)	18031600	100	90			MNDNR - Wildlife	Wild rice can completely cover basin.		poor		difficul	Privately managed wild rice lake (Pratt). Large, 6' beaver dam removed in 2006, scattered rice coverag	BDR	NatOut					Wild rice can completely cover basin.
Crow Wing	Unnamed (Lost Rice)	18022800	157	80		M	MNDNR - Wildlife	Wild rice can completely cover basin.		poor	low	difficul		BDR	NatOut					Wild rice can completely cover basin.
Crow Wing	Dog	18010700	71	71		M	MNDNR - Wildlife	Wild rice is found throughout the lake area in stands of var		poor	low	easy	MNDNR designated Game Lake.	BDR	VC		County	Co. DOT		Wild rice density is moderate to lush (3 ot 4), and its cond
Crow Wing	Pine	18026100	391	60				Wild rice located along east shore, Pine River channel.						NA	RD					Wild rice located along east shore, Pine River channel.
Crow Wing	Mud	18032600	82	60				Wild rice can cover a majority of open water basin.			low									Wild rice can cover a majority of open water basin.
Crow Wing	Rice (Blomberg's)	18012100	78	60				Wild rice was found throughout the open water area of the ba		fair	low	fair		NA	NatOut					Wild rice was found throughout the open water area of the ba
Crow Wing	Terry	18016200	102	55	1	M	MNDNR - Wildlife	Wild rice can cover a majority of open water portion of basi		fair	low	difficul		BDR	NatOut		Federal	USACOE, Part of Pine River Res. System		Wild rice can cover a majority of open water portion of basi
Crow Wing	Upper Whitefish	18031000	7,969	50	31		USACOE - Crosslake RA						20+ lake, Pine flows into lake +30.		VC					Wild rice density was scattered to moderate (2 to 3), and it
Crow Wing	Lower Mission	18024300	739	50		A	MNDNR - Wildlife	Wild rice density was scattered to moderate (2 to 3), and it						WLM	VC					Wild rice density was scattered to moderate (2 to 3), and it
Crow Wing	Smith	18002800	486	49				Wild rice located in NW bay, west and east shorelines.							?					Wild rice located in NW bay, west and east shorelines.
Crow Wing	Rice Bed	18018700	50	47			MNDNR - Wildlife	Wild rice can completely cover basin.		fair	low	difficul		BDR	NatOut		Twp	Twp		Wild rice can completely cover basin.
Crow Wing	Lows	18018000	320	45	4	A	MNDNR - Wildlife	Wild rice located around outlet (NW) and inlet (SE).		poor	low	easy		BDR	C					Wild rice located around outlet (NW) and inlet (SE).
Crow Wing	Twentytwo	18000800	169	42				Wild rice located along NW and SE shoreline.							?					Wild rice located along NW and SE shoreline.
Crow Wing	Twin Island	18010600	85	42				Wild rice can cover a majority of open water basin.		poor	low	fair	History of 50 to 100% coverage in the 1950s & 60s.	NA	NatOut		Private			Wild rice can cover a majority of open water basin.
Crow Wing	Whipple	18038700	345	40				Wild rice exists primarily in lower basin (Moberg's Slew).												Wild rice exists primarily in lower basin (Moberg's Slew).
Crow Wing	Arrowhead	18036600	285	40			USACOE - Cross Lake RA	Wild rice in SE corner/outlet to Whitefish Lake and NE corne		poor	low	fair		WLM	VC		Federal	USACOE, Part of Pine River Res. System		Wild rice in SE corner/outlet to Whitefish Lake and NE corne
Crow Wing	Unnamed (Nokasippi R. Rice Be	18048500	166	40				Wild rice can completely cover open water portion of basin.				difficul			NatOut					Wild rice can completely cover open water portion of basin.
Crow Wing	Mud	18013700	132	40		A	MNDNR - Wildlife	Wild rice located in western 2/3rds of basin.		poor	low	fair		BDR	NatOut					Wild rice located in western 2/3rds of basin.
Crow Wing	Birchdale	18017500	80	40		M	MNDNR - Wildlife	History of almost complete basin coverage, outlet structure		poor		fair		BDR	NatOut					History of almost complete basin coverage, outlet structure
Crow Wing	Little Pine	18017600	135	30	6	M	MNDNR - Wildlife	History (1960s) of harvestable stands in NE &SW corners of l		poor	low	fair		BDR	NatOut					History (1960s) of harvestable stands in NE &SW corners of l
Crow Wing	Dahler	18020400	277	28	12	M	MNDNR - Wildlife/DU	Wild rice located around shoreline.		poor	low	easy		BDR	FC					Wild rice located around shoreline.
Crow Wing	Google	18022300	107	11	6			Wild rice along outlet and outlet river channel.		poor	low	fair		NA	NatOut					Wild rice along outlet and outlet river channel.
Crow Wing	Middle Cullen	18037700	405	2	5						low				VC		Federal	USACOE, Part Gull L. Res System		
Crow Wing	Mississippi River	18r1		1	78								Brainerd dam?							
Hubbard	Mantrap	29015100	1,770	200	7		Industrial - 3M			fair	low	easy	1997 data: 200 ft fringe. Rack placed to manage level	WLM	FC		Private	Industrial - 3M		
Hubbard	Fourth Crow Wing	29007800	523	130	7					fair	low	easy			FC		Unknown			
Hubbard	Hart	29006300	236	118	14						moderate	easy								
Hubbard	Garfield	29006100	984	90	5			South bay.			low	easy								South bay.
Hubbard	Island	29025400	522	60	3		County			poor	low	easy	1996 data: west arm	BDR	C		County	Co. DOT		

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	Owner/Managed by	Wildlife coverage	NatAm	harvest potential	harvest pressure	harvest access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments
Hubbard	Rice	29017700	230	58	2 M	County			fair	low	difficul	1997 data	BDR	C		County	Co. DOT		
Hubbard	First Crow Wing	29008600	564	50	3				fair	low	easy	1997 data. Rack placed to manage level.		FC		County	Unknown		
Hubbard	Upper Mud	29028400	50	50		M			fair	low	difficul	private access.							
Hubbard	Third Crow Wing	29007700	636	40					fair	low	easy	Rack under bridge under 109 control level							
Hubbard	Lake George	29021600	882	18	11				fair	low	easy	1997 data							
Hubbard	Lake Alice	29028600	150	15	11	County				low			BDR	C		County	Co. DOT		
Hubbard	Crow Wing	29011600	47		14														
Hubbard	Spring Lake	29005400	43		5				fair	low	difficul								
Isanti	Upper Rice	30005700	208	208								Level affected by ditch							
Itasca	Natures	31087700	2,885	2,499	89		Can cover a majority of basin in good years.	R-LL	good	high	fair			NatOut					Can cover a majority of basin in good years.
Itasca	Bowstring	31081300	8,900	1,335	26		Cow, Grouse and Muskrat bays.	LLUR	good	high	fair			NatOut					Can cover a majority of basin in good years.
Itasca	Rice	31087600	911	729	1			LLUR	fair	moderate	easy	1994 data. 1997: 50%. In Bowstring River		NatOut					Cow, Grouse and Muskrat bays.
Itasca	Pigeon Dam	31089400	511	500		MNDNR - Wildlife		LLUR	good	high	easy		WLM	VC	Stop log	Federal	USFWS		
Itasca	Bass	31057600	2,844	427	53	MNDNR - Waters			fair	high	easy		WLM	VC	WPA dam	State	MNDNR - Waters		
Itasca	Cut Foot Sioux	31085700	3,222	322	3	USACOE - Winnibigoshish L. RA		LLUR	good	moderate	easy	1997 data. Influenced by the Winnie dam	WLM	VC	Sliding grate	Federal	USACOE		
Itasca	Blackwater	31056100	674	300	10	USACOE - Pokegemama Lake RA			fair	moderate	easy	1997. Influence by Pokegawa Dam - USACOE	WLM	VC	Sliding grate	Federal	USACOE		
Itasca	White Oak	31077600	905	271	10	USACOE - Pokegemama Lake RA	Eastern half of basin.	LLUR	fair	low	easy		WLM	VC		Federal	USACOE		Eastern half of basin.
Itasca	Mud	31020600	271	203		M			fair	low	difficul	History of beaver problems, private access.		NatOut					
Itasca	First River	31081800	228	160	14	USACOE - Winnibigoshish L. RA		LLUR	fair	low	fair		WLM	VC			Federal		
Itasca	Rabbits	31092300	209	157				LLUR	good	moderate	difficul	Bog problem, sometimes restricts outlet.		NatOut					
Itasca	Little Cut Foot Sioux	31085200	1,357	136		USACOE - Winnibigoshish L. RA		LLUR	fair	low	easy		WLM	VC		Federal	USACOE		
Itasca	Pokegama	31053200	15,600	100	6	USACOE - Pokegemama Lake RA	Primarily in Little Pokegama bay.			moderate			WLM	VC		Federal	USACOE		Primarily in Little Pokegama bay.
Itasca	Dora	31088200	477	89	11				fair	moderate	easy			NatOut					
Itasca	Helen	31084000	109	76							difficul			NatOut					
Itasca	Raven	31092500	97	70		M		LLUR	good	low	difficul	History of beaver problems.	BDR	?	BPL	Tribal	R - LL		
Itasca	Dixon	31092100	666	67	3	MNDNR - Wildlife/Dixon LA				low	easy		BDR	NatOut					
Itasca	Decker	31093400	292	58		M					easy		BDR	NatOut		Cooperative	SWCD, Dickson Lake Association		
Itasca	Spruce	31034700	58	58							easy			NatOut					
Itasca	Swan	31006700	2,472	50	11					moderate				NatOut					
Itasca	Blackberry	31021000	240	50	2 M	MNDNR - Wildlife/DU			fair	low	fair	Also private management- lakeshore owners.	BDR	C		County	County		
Itasca	Sand	31082600	3,391	50										NatOut					
Itasca	Nagel	31037700	90	50		M					difficul			NatOut					
Itasca	Prairie	31038400	1,167	45							fair			NatOut					
Itasca	Prairie	31005300	29	1	31	Industrial - MN Power				high		1997 data	BDR	Dam		Industrial	Industrial - MN Power		
Itasca	Mississippi River	31r6			74														
Itasca	Big Fork River	31r3			18														
Itasca	Bowstring River	31r4			7														
Koochiching	Nett	36000100	7,301	2,000	20			NLUR											
Koochiching	Rat Root	36000600	734		9					low		added from state harvester survey.							
Lake	Basswood	38064500	14,610	485			Black, Hoist, Rice, and Wind bays.		fair		difficul	1982 data - Back bay: 150 acres, Wind bay: 200 acres, Hoist							Black, Hoist, Rice, and Wind bays.
Lake	Stony	38066000	409	245	12				fair	moderate	difficul								
Lake	Garden	38078200	4,236	212	2	Industrial - MN Power				low		1997 data	WLM	VC		Industrial	Industrial - MN Power		
Lake	Rice	38046500	206	206								1987 data							
Lake	Bonga	38076200	138	138								1987 data							
Lake	Wood	38072900	587	125			NE Bay and Madden Cr. Bay lush, other areas scattered.		fair		difficul								NE Bay and Madden Cr. Bay lush, other areas scattered.
Lake	Hula	38072800	121	121	3		Rice lush in bay by portage coming from Wood Lake.		fair	low	difficul								Rice lush in bay by portage coming from Wood Lake.
Lake	Lobo	38076600	132	99								1992 data							
Lake	Muskeg	38078800	178	71					poor		difficul	1970 data. Beaver problems				Federal	USFS - BWCA		
Lake	Round Island	38041700	58	58	10 A	MNDNR - Wildlife/R-FDL	Can completely cover basin.	1854	good	moderate	fair								Can completely cover basin. Surveyed annually by 1854 Treaty Auth
Lake	Campers	38067900	56	56	13 M		Can cover a majority of basin.		fair	moderate	fair								Can cover a majority of basin. Surveyed annually by 1854 Treaty Auth
Lake	Cramer	38001400	69	55	15		?	1854	fair	moderate	easy								Average # stalks per 0.5 sq. meters is 21-40.
Lake	Cabin	38026000	71	55	4 M		Can cover a majority of basin.	1854	good	moderate	fair								Average # of stalks per 0.5 sq. meter is 0-20.
Lake	Sand	38073500	506	51	5				poor	low	fair								
Lake	Snowbank	38052900	4,819	50								One bay has rice, 50 acres at most							
Lake	Island River	38084200	49	49	6				good	low	easy								
Lake	Dumbbell	38039300	476	48				1854	fair	moderate	easy								
Lake	Clark	38064700	49		13 A			1854	fair	moderate	fair								
Lake	Cloquet	38053900	176		10					low		added from 1854M list.							
Lake	Greenwood	38065600	1,300				good stand on N end, rice coverage on S end also												
Lake	Farm	38077900	1,292				fair potential in some areas?, no field data												
Lake	Moose	38003600	201				rice coverage over most of lake												
Lake	Gegoka	38057300	176				moderately dense on N end, along shore, about 1/4 covered												
Lake	Hoist	38025100	113				typically one-half to completely covered with rice												
Lake	Hjalmer	38075800	109				rice over about three-fourths of lake												
Lake	Middle McDougal	38065800	108				one-third to three-fourths coverage												
Lake	Phantom						57-58N, 10W - most of lake covered												
Lake of the Woods	Roseau Flowage	39IMP001	200	100		MNDNR - Wildlife						Rice acres have drastically declined in late 1990's	WLM	VC	DI	State	MNDNR		
Lake of the Woods	Rainy River	39r5			12					low		added from state harvester survey.							
Lake of the Woods	Winter Road River	39r4			6					low		added from state harvester survey.							
Mille Lacs	Onamia	48000900	2,250	1,350	38	MNDNR - Wildlife				high		1964: 1350 acres of rice		VC		State	MNDNR - Waters		
Mille Lacs	Ernst Pool	48003600	300	200								Very good stand but poor seed production again							
Mille Lacs	Dewitt Marsh	48002000	110	131		MNDNR - Wildlife						this year.	BDR	VC		State	MNDNR - Wildlife		Wild rice density is lush (4), and it conditions was fair (2)

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	DNR/DU	Managed by	Wildlife coverage	NatAdm	harvest-potential	harvest-pressure	harvest-access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments	
Morrison	Skunk	49002600	320	256	A	MNDNR	Wildlife	Throughout lake.		fair	low	easy	Water levels managed by outlet dam on Platte River, Rice Lak	WLM	VC		State	MNDNR - Wildlife		Throughout lake.	
Morrison	Rice	49002500	323	250	A	MNDNR	Wildlife	Excellent coverage at spots along shoreline in Rice Lake & n		fair	low	easy	Water levels managed by outlet dam on Platte River, Rice Lak	WLM	VC		State	MNDNR - Wildlife		Excellent coverage at spots along shoreline in Rice Lake & n	
Morrison	Twelve	49000600	159	80									Private access.				Private	Private			
Morrison	Coon	49002000	75	75									Lake within Coon Lake State WMA.						common		
Otter Tail	Ottertail River	56r1																		33	
Otter Tail	Lake Sixteen	56010000	107																	5	
Otter Tail	Star	56038500	4809.0					historic rice camp													
Pine	Crooked	58002600	94	85	5								1989 Survey				State	MNDNR - Waters			
Pine	Hay Creek Flowage	58000500	66	40	5									FC			State	MNDNR - Waters			
Pine	Willow River	58r1											added from state harvester survey. Rice has been observed intermittently, also noticed on past				State	MNDNR - Wildlife			
Rice	Mud	66005400	269	54									Typically 50 acres of rice, reaches 200 acres in good years.				Federal	USFWS			
Scott	Fisher	70008700	396	190			USFWS - Minnesota Valley NWR						Typically 35 acres of rice, reaches 160 acres in good years.				Federal	USFWS			
Scott	Rice	70002500	328	160			USFWS - Minnesota Valley NWR						Typically 20 acres of rice, reaches 120 acres once every 12-				Federal	Coop - USFWS, Private			
Scott	Blue	70008800	316	120			USFWS - Minnesota Valley NWR						Natural lake that was ditched				Federal	USFWS			
Sherburne	Orrock	71IMP010	215	162			USFWS - Sherburne NWR										Federal	USFWS - Sherburne NWR			
Sherburne	Rice		487	187			USFWS - Sherburne NWR	good rice crop in 2009									Federal	USFWS - Sherburne NWR			
Sherburne	Schoolhouse Pool	71IMP009	225	90			USFWS - Sherburne NWR										Federal	USFWS - Sherburne NWR			
Sherburne	Josephine Pool	71IMP008	143	72			USFWS - Sherburne NWR										Federal	USFWS - Sherburne NWR			
St. Louis	Knuckey	69080000	71					lake can be about one-half covered, some use by harvesters									Federal	USFWS - Sherburne NWR			
St. Louis	Lapond	69017700	176	176	M					fair		difficul	1972 data (100%), now 5% rice								
St. Louis	Big Rice	69066900	2,072	1,700	64		MNDNR - Wildlife	Throughout lake, typically open in the center.	1854	good	high	easy	Outlet and pickerleweed control issues. Seeded by Forest Service in 1985. Possible old logging dam.	BDR	FC		State	MNDNR - Wildlife		Throughout lake, typically open in the center. Surveyed annually by 1854 Treaty Auth	
St. Louis	Seven Beaver	69000200	1,508	1,282	3		USFS	Best rice is located in the narrows and south bay of lake, b		good	low	difficul		BDR	FC		Federal	USFS		Best rice is located in the narrows and south bay of lake, b	
St. Louis	Crane	69061600	3,396	600	1					good	low										
St. Louis	Vermilion River	69061300	1,125	562	66			?		good	high	easy								surveyed annually by 1854 Treaty Authority	
St. Louis	Big Rice	69017800	416	416	M					fair	high	difficul	1977 data, now 4 acres (1%).								
St. Louis	Butterball	69004400	442	400	1		MNDNR	No thick beds of rice this year with rice across most of the		good	low	difficul		BDR			State	MNDNR		No thick beds of rice this year with rice across most, also called Long	
St. Louis	Birch	69000300	7,628	381	5		Industrial - MN Power			good	low	easy		WLM	VC		Industrial	Industrial - MN Power		Can completely cover basin. Surveyed annually by 1854 Treaty Auth	
St. Louis	Little Rice	69061200	266	266	31		MNDNR - Wildlife	Can completely cover basin.		fair	high	easy		BDR	C		State	MNDOT		Can completely cover basin. Surveyed annually by 1854 Treaty Auth	
St. Louis	Hoodoo	69080200	252	252	3	M	MNDNR - Wildlife	Rice found over the entire lake at various densities from ra			low		1997 data	BDR						Rice found over the entire lake at various densities from ra	
St. Louis	Vermillion	69037800	49,110	250			Dam?			poor		easy	Pike Bay: historically heavy rice, 250 acres, before structure, Rice Bay also	BDR	FC		State	MNDNR - Waters			
St. Louis	Sturgeon	69093900	2,050	243			County						CCC program	BDR	VC	WPA dam	State	County			
St. Louis	Stone	69004600	230	173	54		MNDNR - Wildlife	?				moderate		BDR			State	State		surveyed annually by 1854 Treaty Authority	
St. Louis	Breda	69003700	137	135	66	A		Can completely cover basin in good years.	1854	good	high	fair								Average # of stalks per 0.5 sq. meter is 61-80.	
St. Louis	Bear	69011200	125	125					1854				1994 Survey data								
St. Louis	Sandy	69073000	121	121			MNDNR	historic good crops, (Twin Lakes)					1982 data. Used to manage but quit in 1992. Not managed currently	BDR	C		State	County			
St. Louis	Pelican	69084100	11,944	119	16							moderate		VC	WPA dam	State	County	USFS			
St. Louis	Hay	69057900	114	114			MNDNR - Wildlife							BDR			Federal	USFS			
St. Louis	Shannon	69092500	135	108	5	M		Best rice located at outlet of lake with some fringe rice on			low		1996 data				Federal	USFS		Best rice located at outlet of lake with some fringe rice on	
St. Louis	Leeman	69087500	284	90			Private, now public?						1997 data	BDR			Private	Private			
St. Louis	Little Sandy	69072900	89	89				historic good crops, (Twin Lakes)					1982 data: mining tailings over flow. Used to manage, quit								
St. Louis	Stone	69003500	87	85	M		Twp		1854					BDR	C		Twp	Twp		also called Tommila Lake	
St. Louis	Canosia WMA, Angell Pool	W0889001	500	80			MNDNR - Wildlife						1997 data. Seeded with 300 lbs in 1988. Historically good rice but not since the 60's.	BDR	C	BPL	State	MNDNR - Wildlife			
St. Louis	Hay	69043500	78	78			MNDNR - Wildlife	little rice in 2009- Barr Eng (PolyMet)						BDR	VC		Cooperative	Coop - County, DNR - WL, FDL			
St. Louis	Low	69007000	353	71	2			only sparse rice plants in 2002		poor	low	easy	Data 1960's, currently 0% - beaver problems								
St. Louis	Hockey	69084900	139	70	9																
St. Louis	Moose	69079800	82	62	36		MNDNR - Wildlife			fair	moderate	fair	Excellent bed of rice still no good access to lake due to ne	BDR	C		County	County			
St. Louis	Turpela	69042700	76	61	M					poor		difficul					County	County			
St. Louis	Bug	69053100	71	53									1985 data								
St. Louis	Wabuse	69040800	64	51			MNDNR - Wildlife			fair		difficul	1997 data. Managed by Eveleth. Rice seems not to be able to expand due to other aquatic veg	BDR							
St. Louis	Dollar	69053400	51	51			MNDNR - Wildlife							BDR							
St. Louis	Hay	69041700	82	45				Best stand is on the east end of lake with the rice continui												Wild rice density is moderate (3), and its condition was goo	Best stand is on the east end of lake with the rice continui
St. Louis	Mud	69079700	43	43			MNDNR - Wildlife			poor		difficul	1972 data: 100 % (43 acres) Forest Service seeded in 1992.	BDR	C		County	County			
St. Louis	Rice	69057800	41	41			MNDNR - Wildlife	Good rice bed across lake and downstream.					1996 data	BDR			Federal	USFS		Good rice bed across lake and downstream.	
St. Louis	Washusk Number One	69040900	51	40			MNDNR - Wildlife			fair		difficul	1997 data. Managed by Eveleth.	BDR							
St. Louis	Rainy	69069400	220,800		17						low		Unknown rice production								
St. Louis	Wolf	69014300	456		17	M			1854	fair	moderate	difficul									
St. Louis	Saint Louis River	69r2			14			headwaters, Norway Pt, historic in estuary	1854	fair	moderate	easy									
St. Louis	Pike River	69r1			9				1854	fair	moderate	easy									
St. Louis	Burntside	69011800	7,314					fair potential in some areas?, no field data													
St. Louis	Anchor	69064100	316					thicker rice in narrows and back bays, around 20% coverage													
St. Louis	Rice	69018000	110					64N, 13W - fair potential for rice?, no field data, BWCA lake													
St. Louis	East Stone	69063800	80					can be half covered with good density													

County	Basin Name	Dow No.	DOW acres	WR acres	Harvest trips	DNR/DU	Managed by	Wildlife coverage	NatAm	harvest potential	harvest pressure	harvest access	Comments	Management types	Outlet structure	Outlet structure comment	Owner	Owner class	WILD_RICE	WR comments
St. Louis	Little Indian Sioux River							66N, 15W - good stands along banks, used by harvesters can have thick rice over entire lake, some use by harvesters												
St. Louis	Papoose	69002400						56N, 12W - thick rice in areas, used by harvesters into Breda L												
St. Louis	Petrel Creek							60N, 16W - can contain good stands												
St. Louis	Sand River							55N, 15W - rice along shore, sparse in center												
St. Louis	Washusk #2							58N, 14-15W - number of stands with good density												
St. Louis	Partridge River							64N, 19W - can have thick rice over entire lake (2007, 2008)												
St. Louis	Rice																			
Stearns	Tamarack	73027800	470	235				island clumps throughout					Wild rice was planted by the Belgrade Sportmen's Club in 19				State	MNDNR - Wildlife		island clumps throughout
Todd	Long	77006900	356	338	1	M	MNDNR - Wildlife	Typically thickest in north portion of lake, more spotty in	fair	low	easy		Water influenced by Turtle Creek watershed. Lake adjacent to	BDR	NatOut		Cooperative	Private, State		Typically thickest in north portion of lake, more spotty in
Todd	Mud	77008700	398	318		M	MNDNR - Wildlife	Rice typically around shoreline, can cover almost all of ope	fair	low	fair		Water influenced by Turtle Creek watershed. Lake within Turt	BDR			Private	Private		Rice typically around shoreline, can cover almost all of ope
Todd	Twin	77002100	317	159		M					fair		County ditch outlet on west side. Access thru Ostendorf Stat				Cooperative	Private, Public		
Todd	Rogers	77007300	185	130	1	M		Typically in a wide band around shoreline.			low	difficul	outlet has c				Private	Private		Typically in a wide band around shoreline.
Todd	Nelson	77000500	84	70		M		Entire lake.			difficul		Private access.	C					Wild rice density is lush (4) to rank (5), and its condition	Entire lake.
Todd	Rice	77006100	675	60		M		Most of rice on south end where connected to Thunder Lake.	fair	low	difficul		Problems with water from Turtle Creek watershed.				Cooperative	Private, Public		Most of rice on south end where connected to Thunder Lake.
Wabasha	Zumbro River							Zumbro Bottoms, McCarthy Lake - acreage, wildlie value												
Wadena	Yaeger	80002200	384	346		M	MNDNR - Wildlife	Entire lake, best stands are located on west side & across t	fair	moderate	easy			BDR	VC		State	MNDNR - Wildlife		Entire lake, best stands are located on west side & across t
Wadena	Burgen	80001800	92	86			MNDNR - Wildlife	Covers 93% of water area.	poor	low	difficul						Private	Private		Covers 93% of water area.
Wadena	Strike	80001300	76	76				1988: sparce rice. 1963 100% covered.	fair	low	difficul									1988: sparce rice. 1963 100% covered.
Wadena	Round	80001900	58	58		A	MNDNR - Wildlife/DU		fair	moderate	fair	1993		BDR						
Wadena	Granning	80001200	50	50				Entire lake.			low	fair	1988 Sparce rice. 1963: 50 acres of rice (100%)							Entire lake.
Wadena	Blueberry	80003400	555.0	30.0				historic wild rice camp												
Waseca	Everson	81002700	79.0	20.0				Stand around perimeter of the lake between cattail/phrag. Fringe and open water. Varies in size and density year to year.					Stand was only about 10 acres in 2009							
Waseca	Lilly	81006700	125.0	38.0				Dense stand around perimeter of the basin												
Wright	Sandy	86022400	118	150				Entire lake.					Within Suconix State WMA.						In 2004, wild rice density was moderate (3) and in fair (2)	Entire lake.

## **Appendix D**

**Plant Data (Total, root, and seed biomass, seed number)**

**Appendix D**  
**Embarrass River**  
**Plant Data**

Date	Sample ID	Seed Weight (g)	Seed Count (#)	Root Weight (g)	Stalk Weight (g)	Actual Total Plant Weight (g)	Calculated Total Plant Weight (g)	Difference (g)
11/9/2010	PM/CL-CIL-LAD-WR01	0.04	11	0.1	0.67	0.81	0.81	0
11/9/2010	PM/CL-CIL-LAD-WR02	0.07	6	0.1	1.61	1.73	1.78	-0.05
11/9/2010	PM/CL-CIL-LAD-WR03	0.06	8	0.08	1.14	1.27	1.28	-0.01
11/9/2010	PM/CL-CIL-LAD-WR04	0.01	2	0.24	0.66	0.9	0.91	-0.01
11/9/2010	PM/CL-CIL-LAD-WR05	0.03	12	0.06	0.52	0.61	0.61	0
11/9/2010	PM/CL-CIL-LAD-WR06	0	0	0.06	0.66	0.72	0.72	0
11/9/2010	PM/CL-CIL-LAD-WR07	0.06	12	0.14	0.65	0.85	0.85	0
11/9/2010	PM/CL-CIL-LAD-WR08	0.02	2	0.04	0.34	0.4	0.4	0
11/10/2010	PM/CL-CIL-LAD-WR09	0.05	4	0.02	0.51	0.58	0.58	0
11/10/2010	PM/CL-CIL-LAD-WR10	0	0	0.03	0.62	0.65	0.65	0
11/10/2010	PM/CL-CIL-LAD-WR11	0.07	10	0.27	1.62	1.95	1.96	-0.01
11/10/2010	PM/CL-CIL-LAD-WR12	0.05	6	0.11	1.06	1.21	1.22	-0.01
11/10/2010	PM/CL-CIL-LAD-WR13	0.03	5	0.03	0.57	0.63	0.63	0
11/10/2010	PM/CL-CIL-LAD-WR14	0.04	13	0.01	0.77	0.82	0.82	0
11/10/2010	PM/CL-CIL-LAD-WR15	0.05	8	0.05	0.67	0.76	0.77	-0.01
11/10/2010	PM/CL-CIL-LAD-WR16	0.05	6	0.17	0.29	0.51	0.51	0
11/10/2010	PM/CL-CIL-LAD-WR17	0.14	11	0.17	1.13	1.43	1.44	-0.01
11/10/2010	PM/CL-CIL-LAD-WR18	0.1	15	0.15	1.39	1.64	1.64	0
11/10/2010	PM/CL-CIL-LAD-WR19	0.06	3	0.05	0.87	0.99	0.98	0.01
11/10/2010	PM/CL-CIL-LAD-WR20	0	0	0.04	1.27	1.32	1.31	0.01
11/30/2010	PM/CL-UNL-LAD-WR01	0.03	9	0.01	0.39	0.42	0.43	-0.01
11/30/2010	PM/CL-UNL-LAD-WR02	0.06	10	0.08	0.91	1.04	1.05	-0.01
11/30/2010	PM/CL-UNL-LAD-WR03	0.05	13	0.13	0.64	0.82	0.82	0
11/30/2010	PM/CL-UNL-LAD-WR04	0.11	9	0.21	0.5	0.82	0.82	0
11/30/2010	PM/CL-UNL-LAD-WR05	0.03	7	0.15	0.39	0.57	0.57	0
11/30/2010	PM/CL-UNL-LAD-WR06	0.13	19	0.03	0.64	0.8	0.8	0
11/30/2010	PM/CL-UNL-LAD-WR07	0.05	17	0.03	0.53	0.6	0.61	-0.01
11/30/2010	PM/CL-UNL-LAD-WR08	0.19	12	0.25	1.56	2	2	0
11/30/2010	PM/CL-UNL-LAD-WR09	0.14	18	0.16	1.23	1.53	1.53	0
11/30/2010	PM/CL-LEM-LAD-WR21	0.13	37	0.02	1.32	1.47	1.47	0
12/1/2010	PM-EMB-NGP-WR01	0.25	101	0.45	5.91	6.61	6.61	0
12/1/2010	PM-EMB-NGP-WR02	0.24	65	0.13	4	4.37	4.37	0
12/1/2010	PM-EMB-NGP-WR03	0.73	69	0.13	5.93	6.78	6.79	-0.01
12/1/2010	PM-EMB-NGP-WR04	0.12	67	0.02	4.4	4.54	4.54	0
12/1/2010	PM-EMB-NGP-WR05	0.04	14	0.02	1.17	1.24	1.23	0.01
12/1/2010	PM-WYN-LAD-WR01	0.69	30	0.42	3.56	4.67	4.67	0
12/1/2010	PM-WYN-LAD-WR02	0.72	109	1.15	8.09	9.97	9.96	0.01
	Mean	0.125405405	20	0.143513514	1.572702703	1.838648649	1.841621622	-0.002972973
	Median	0.06	11	0.1	0.87	0.99	0.98	0
	Standard Deviation	0.1870323	26.94541808	0.20005855	1.818437438	2.125879115	2.124760789	0.009962392

**Appendix D**  
**Partridge River**  
**Plant Data**

Date	Sample ID	Seed Weight (g)	Seed Count (#)	Root Weight (g)	Stalk Weight (g)	Actual Total Plant Weight (g)	Calculated Total Plant Weight (g)	Difference (g)
11/30/2010	PM-PAR-KDM-WR36	1.82	246	2.13	17.94	21.87	21.89	-0.02
11/30/2010	PM-PAR-KDM-WR37	0.81	135	1.43	12.24	14.46	14.48	-0.02
11/30/2010	PM-PAR-KDM-WR38	1.21	248	1	9.71	11.93	11.92	0.01
11/30/2010	PM-PAR-KDM-WR39	0.48	75	0.63	6.46	7.57	7.57	0
11/30/2010	PM-PAR-KDM-WR40	2.54	431	5.57	36.44	44.55	44.55	0
11/30/2010	PM-PAR-KDM-WR41	0.34	49	0.09	2.65	3.09	3.08	0.01
11/30/2010	PM-PAR-KDM-WR42	0.4	62	0.58	5.88	6.86	6.86	0
11/30/2010	PM-PAR-KDM-WR43	0.04	19	0.12	3.77	3.93	3.93	0
11/30/2010	PM-PAR-KDM-WR44	0.25	45	0.14	2.31	2.69	2.7	-0.01
11/30/2010	PM-PAR-KDM-WR45	0.22	49	0.22	3.19	3.62	3.63	-0.01
11/30/2010	PM-PAR-KDM-WR46	0.23	44	0.33	4.02	4.58	4.58	0
11/30/2010	PM-PAR-KDM-WR47	0.02	4	0.09	2.09	2.21	2.2	0.01
11/30/2010	PM-PAR-KDM-WR48	0.05	22	0.2	2.11	2.36	2.36	0
11/30/2010	PM-PAR-KDM-WR49	0.39	129	0.42	6.91	7.72	7.72	0
11/30/2010	PM-PAR-KDM-WR50	0.08	28	0.25	3.2	3.53	3.53	0
12/1/2010	PM-PAR-KDM-WR06	0.18	48	0.23	4.19	4.59	4.6	-0.01
12/1/2010	PM-PAR-KDM-WR07	0.04	8	0.04	1.4	1.49	1.48	0.01
12/1/2010	PM-PAR-KDM-WR08	0.11	32	0.18	2.65	2.95	2.94	0.01
12/1/2010	PM-PAR-KDM-WR09	0.17	52	0.23	3.5	3.88	3.9	-0.02
12/1/2010	PM-PAR-KDM-WR10	0.09	11	0.27	2.7	3.05	3.06	-0.01
12/1/2010	PM-PAR-KDM-WR11	0.2	39	0.77	3.61	4.58	4.58	0
12/1/2010	PM-PAR-KDM-WR12	0.08	14	0.03	0.93	1.04	1.04	0
12/1/2010	PM-PAR-KDM-WR13	0.05	11	0.14	0.98	1.17	1.17	0
12/1/2010	PM-PAR-KDM-WR14	0.13	34	0.2	2.22	2.55	2.55	0
12/1/2010	PM-PAR-KDM-WR15	0.01	7	0.02	0.27	0.3	0.3	0
12/1/2010	PM-PAR-KDM-WR16	0	0	0.04	1.08	1.12	1.12	0
12/1/2010	PM-PAR-KDM-WR17	0.03	9	0.03	1.01	1.07	1.07	0
12/1/2010	PM-PAR-KDM-WR18	0.08	11	0.09	1.03	1.2	1.2	0
12/1/2010	PM-PAR-KDM-WR19	0.07	10	0.14	2.41	2.62	2.62	0
12/1/2010	PM-PAR-KDM-WR20	0.03	14	0.39	3.51	3.93	3.93	0
12/1/2010	PM-PAR-KDM-WR21	0.04	26	0.31	2.11	2.47	2.46	0.01
12/1/2010	PM-PAR-KDM-WR22	0.04	20	0.04	1.61	1.69	1.69	0
12/1/2010	PM-PAR-KDM-WR23	0.01	5	0.04	1.01	1.06	1.06	0
12/1/2010	PM-PAR-KDM-WR24	0.03	14	0.05	0.97	1.05	1.05	0
12/1/2010	PM-PAR-KDM-WR25	0.08	26	0.23	1.77	2.08	2.08	0
12/1/2010	PM-PAR-KDM-WR26	0.02	4	0.1	1.37	1.49	1.49	0
12/1/2010	PM-PAR-KDM-WR27	0	2	0.07	0.97	1.03	1.04	-0.01
12/1/2010	PM-PAR-KDM-WR28	0.02	11	0.27	2.56	2.85	2.85	0
12/1/2010	PM-PAR-KDM-WR29	0.01	5	0.09	1.03	1.13	1.13	0
12/1/2010	PM-PAR-KDM-WR30	0	0	0.23	2.01	2.23	2.24	-0.01
12/1/2010	PM-PAR-KDM-WR31	0	0	0.26	1.92	2.18	2.18	0

**Appendix D  
Partridge River  
Plant Data**

Date	Sample ID	Seed Weight (g)	Seed Count (#)	Root Weight (g)	Stalk Weight (g)	Actual Total Plant Weight (g)	Calculated Total Plant Weight (g)	Difference (g)
12/1/2010	PM-PAR-KDM-WR32	0.21	62	0.54	5.36	6.11	6.11	0
12/1/2010	PM-PAR-KDM-WR33	0.01	7	0.16	0.93	1.1	1.1	0
12/1/2010	PM-PAR-KDM-WR34	0.12	36	0.26	1.52	1.9	1.9	0
12/1/2010	PM-PAR-KDM-WR35	0.04	3	0.16	1.07	1.26	1.27	-0.01
12/2/2010	PM-PAR-KDM-WR01	0.1	53	0.11	1.69	1.9	1.9	0
12/2/2010	PM-PAR-KDM-WR02	0.1	42	0.17	1.27	1.54	1.54	0
12/2/2010	PM-PAR-KDM-WR03a	0.07	32	0.35	5.07	5.49	5.49	0
12/2/2010	PM-PAR-KDM-WR03b	0.23	76	0.76	11.28	12.26	12.27	-0.01
12/2/2010	PM-PAR-KDM-WR04	0.28	119	0.96	9.95	11.17	11.19	-0.02
	Mean	0.2312	48.58	0.4232	4.1176	4.77	4.772	-0.002
	Median	0.08	26	0.21	2.265	2.585	2.585	0
	Standard Deviation	0.461460149	76.55226039	0.837446166	5.801449699	7.049861773	7.051650263	0.007559289

**Appendix D  
Pike River  
Plant Data**

Date	Sample ID	Seed Weight (g)	Seed Count (#)	Root Weight (g)	Stalk Weight (g)	Actual Total Plant Weight (g)	Calculated Total Plant Weight (g)	Difference (g)
11/10/2010	PM/CL-RL-LAD-WR01	0.23	53	0.3	2.4	2.93	2.93	0
11/10/2010	PM/CL-RL-LAD-WR02	0.47	79	0.95	2.86	4.27	4.28	-0.01
11/10/2010	PM/CL-RL-LAD-WR03	0.15	27	0.2	2.22	2.56	2.57	-0.01
11/10/2010	PM/CL-RL-LAD-WR04	0.13	29	0.46	2.62	3.2	3.21	-0.01
11/10/2010	PM/CL-RL-LAD-WR05	0.23	41	0.06	1.68	1.96	1.97	-0.01
11/10/2010	PM/CL-RL-LAD-WR06	0.4	57	0.41	2.8	3.61	3.61	0
11/16/2010	PM/CL-RL-LAD-WR07	0.29	48	0.31	3.4	4	4	0
11/16/2010	PM/CL-RL-LAD-WR08	0.24	44	0.41	2.68	3.33	3.33	0
11/16/2010	PM/CL-RL-LAD-WR09	0.13	20	0.1	2.03	2.25	2.26	-0.01
11/16/2010	PM/CL-RL-LAD-WR10	0.16	31	0.08	1.63	1.87	1.87	0
11/16/2010	PM/CL-RL-LAD-WR11	0.24	25	0.02	0.78	1.04	1.04	0
11/16/2010	PM/CL-RL-LAD-WR12	0.47	85	1.11	5.48	7.05	7.06	-0.01
11/23/2010	PM/CL-RL-LAD-WR13	0.14	12	0.11	0.72	0.96	0.97	-0.01
11/23/2010	PM/CL-RL-LAD-WR14	0.16	27	0.64	2.18	2.99	2.98	0.01
11/23/2010	PM/CL-RL-LAD-WR15	0.35	55	0.05	2.04	2.44	2.44	0
11/23/2010	PM/CL-RL-LAD-WR16	0.09	16	0.26	1.45	1.78	1.8	-0.02
11/23/2010	PM/CL-RL-LAD-WR17	0.28	38	0.74	2.16	3.21	3.18	0.03
11/23/2010	PM/CL-RL-LAD-WR18	0.64	97	0.09	3.62	4.34	4.35	-0.01
11/23/2010	PM/CL-RL-LAD-WR19	0.17	20	0.19	1.29	1.64	1.65	-0.01
11/23/2010	PM/CL-RL-LAD-WR20	0.27	21	0.4	2.5	3.17	3.17	0
11/30/2010	POL-HAY-CMH2-WR01	0.25	9	0.89	3.17	4.31	4.31	0
11/30/2010	POL-HAY-CMH2-WR02	0.18	8	0.24	1.16	1.59	1.58	0.01
11/30/2010	POL-HAY-CMH2-WR03	0.39	14	0.22	1.81	2.41	2.42	-0.01
11/30/2010	POL-HAY-CMH2-WR04	0.37	12	0.13	0.95	1.45	1.45	0
11/30/2010	POL-HAY-CMH2-WR05	0.05	11	0.05	0.39	0.49	0.49	0
	Mean	0.2592	35.16	0.3368	2.1608	2.754	2.7568	-0.0028
	Median	0.24	27	0.24	2.16	2.56	2.57	0
	Standard Deviation	0.138621788	24.62160298	0.306468052	1.094904562	1.405664137	1.405909314	0.009797959

**Appendix D  
St Louis River  
Plant Data**

Date	Sample ID	Seed Weight (g)	Seed Count (#)	Root Weight (g)	Stalk Weight (g)	Actual Total Plant Weight (g)	Calculated Total Plant Weight (g)	Difference (g)
12/1/2010	PM-LOU-MRB2-37-WR27 LOCATION	0.09	38	0.01	1.15	1.25	1.25	0
12/1/2010	PM-LOU-MRB2-38-WR28 LOCATION	0.34	44	0.09	3.17	3.6	3.6	0
12/1/2010	PM-LOU-MRB2-39-WR25 LOCATION	0.41	104	0.68	4.91	5.99	6	-0.01
12/1/2010	PM-LOU-MRB2-41-WR18 LOCATION	0.08	36	0.01	0.4	0.5	0.49	0.01
12/1/2010	PM-LOU-MRB2-42-WR19 LOCATION	0.1	31	0.05	0.89	1.03	1.04	-0.01
12/1/2010	PM-LOU-MRB2-43	0.09	44	0.01	0.93	1.02	1.03	-0.01
12/1/2010	PM-LOU-MRB2-44	0.14	27	0.05	1.54	1.75	1.73	0.02
12/1/2010	PM-LOU-TJM2-31	0.62	194	0.04	3.66	4.33	4.32	0.01
12/1/2010	PM-LOU-TJM2-32	0.25	58	0	2.73	2.99	2.98	0.01
12/1/2010	PM-LOU-TJM2-33	0.42	61	0.92	5.16	6.51	6.5	0.01
12/1/2010	PM-LOU-TJM2-34-WR13	0.25	77	0.06	3.02	3.33	3.33	0
12/1/2010	PM-LOU-TJM2-34-WR9	0.24	41	0.05	5.08	5.38	5.37	0.01
12/1/2010	PM-LOU-TJM2-35-WR16	0.06	16	0.11	2.19	2.36	2.36	0
12/1/2010	PM-LOU-TJM2-36	0.03	20	0	0.25	0.27	0.28	-0.01
12/1/2010	PM-LOU-TJM2-40	0.04	44	0.05	0.67	0.77	0.76	0.01
12/2/2010	PM-POK-TJM2-11-GRID 92-PLOT 7	0.33	137	0.05	3.78	4.17	4.16	0.01
12/2/2010	PM-POK-TJM2-12-GRID 92-PLOT 10	0.38	80	0.12	3.5	4.01	4	0.01
12/2/2010	PM-POK-TJM2-13-GRID 92-PLOT30	0.23	68	0.03	3.1	3.36	3.36	0
12/2/2010	PM-POK-TJM2-14-GRID 92-PLOT 80	0.14	62	0.1	1.9	2.14	2.14	0
12/2/2010	PM-POK-TJM2-15-GRID 92-PLOT 97	0.23	80	0.23	3.18	3.63	3.64	-0.01
12/2/2010	PM-POK-TJM2-16-GRID 92-PLOT 46	0.19	48	0.68	2.91	3.78	3.78	0
12/2/2010	PM-POK-TJM2-16-GRID 92-PLOT 64	0.22	86	0.03	2.15	2.4	2.4	0
12/2/2010	PM-POK-TJM2-18-GRID 92-PLOT 41	0.21	66	0.12	3.2	3.53	3.53	0
12/2/2010	PM-POK-TJM2-19-GRID 92-PLOT24	0.13	51	0.18	2.04	2.35	2.35	0
12/2/2010	PM-POK-TJM2-20-GRID 92-PLOT 4	0.15	52	0.79	2.96	3.9	3.9	0
12/2/2010	PM-POK-TJM2-21-GRID 91-PLOT 51	0.3	91	0	3.68	3.97	3.98	-0.01
12/2/2010	PM-POK-TJM2-22-GRID 91-PLOT 53	0.22	92	0.25	4.09	4.56	4.56	0
12/2/2010	PM-POK-TJM2-23-GRID 91-PLOT 34	0.18	40	0.08	3.45	3.69	3.71	-0.02
12/2/2010	PM-POK-TJM2-24-GRID 91-PLOT 15	0.24	56	0.03	1.98	2.25	2.25	0
12/2/2010	PM-POK-TJM2-25-GRID 91-PLOT 6	0.2	59	0.09	5.42	5.71	5.71	0
12/2/2010	PM-POK-TJM2-26-GRID 91-PLOT 36	0.31	128	0	4.03	4.33	4.34	-0.01
12/2/2010	PM-POK-TJM2-27-GRID 91-PLOT 39	0.24	64	0.06	2.4	2.7	2.7	0
12/2/2010	PM-POK-TJM2-28-GRID 91-PLOT 40	0.16	54	0.28	2.62	3.06	3.06	0
12/2/2010	PM-POK-TJM2-29-GRID 91-PLOT 10	0.2	65	0.02	2.42	2.64	2.64	0
12/2/2010	PM-POK-TJM2-30-GRID 91-PLOT 60	0	0	0	2.41	2.41	2.41	0
	Mean	0.212	63.25714286	0.150571429	2.770571429	3.133428571	3.133142857	0.000285714
	Median	0.21	58	0.05	2.91	3.33	3.33	0
	Standard Deviation	0.126811579	36.77062675	0.238018077	1.337671249	1.53666358	1.536416326	0.008219673

## **Appendix E**

### **2009 Ground Wild Rice Survey Results Figures 6 – 21**



**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Rivers and Streams
- City Boundaries

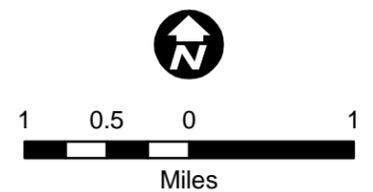


Figure 6  
GROUND WILD RICE SURVEY RESULTS  
FOR SPRING MINE CREEK,  
HAY LAKE (MNID 69435) AND  
UPPER EMBARRASS RIVER  
Surveyed August 19-20, 2009  
NorthMet Project  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota



File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E\_2011\_01\_26\Figure 7 Ground Wild Rice Survey Results for Embarrass Lake Embarrass River.mxd User: arm2  
 Date: 1/26/2011 11:03:45 AM  
 Imagery Source: FSA, 2008

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- City Boundaries

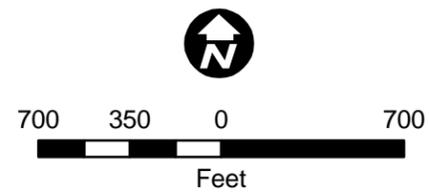


Figure 7  
 GROUND WILD RICE SURVEY  
 RESULTS FOR EMBARRASS LAKE  
 (EMBARRASS RIVER)  
 Surveyed August 20, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\Env\Map\_Min\Work\_Orders\Wild\_Rice\Map\Reports\Appendix E - 2011\_01\_26\Figure 8 Ground Wild Rice Survey Results for Lower Embarrass Lake & Embarrass River.mxd User: arm2  
 Date: 12/26/2011 11:08:14 AM

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Section Boundaries

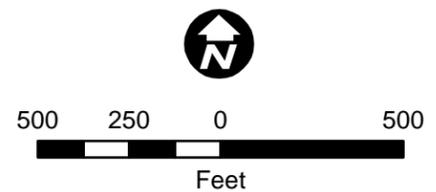
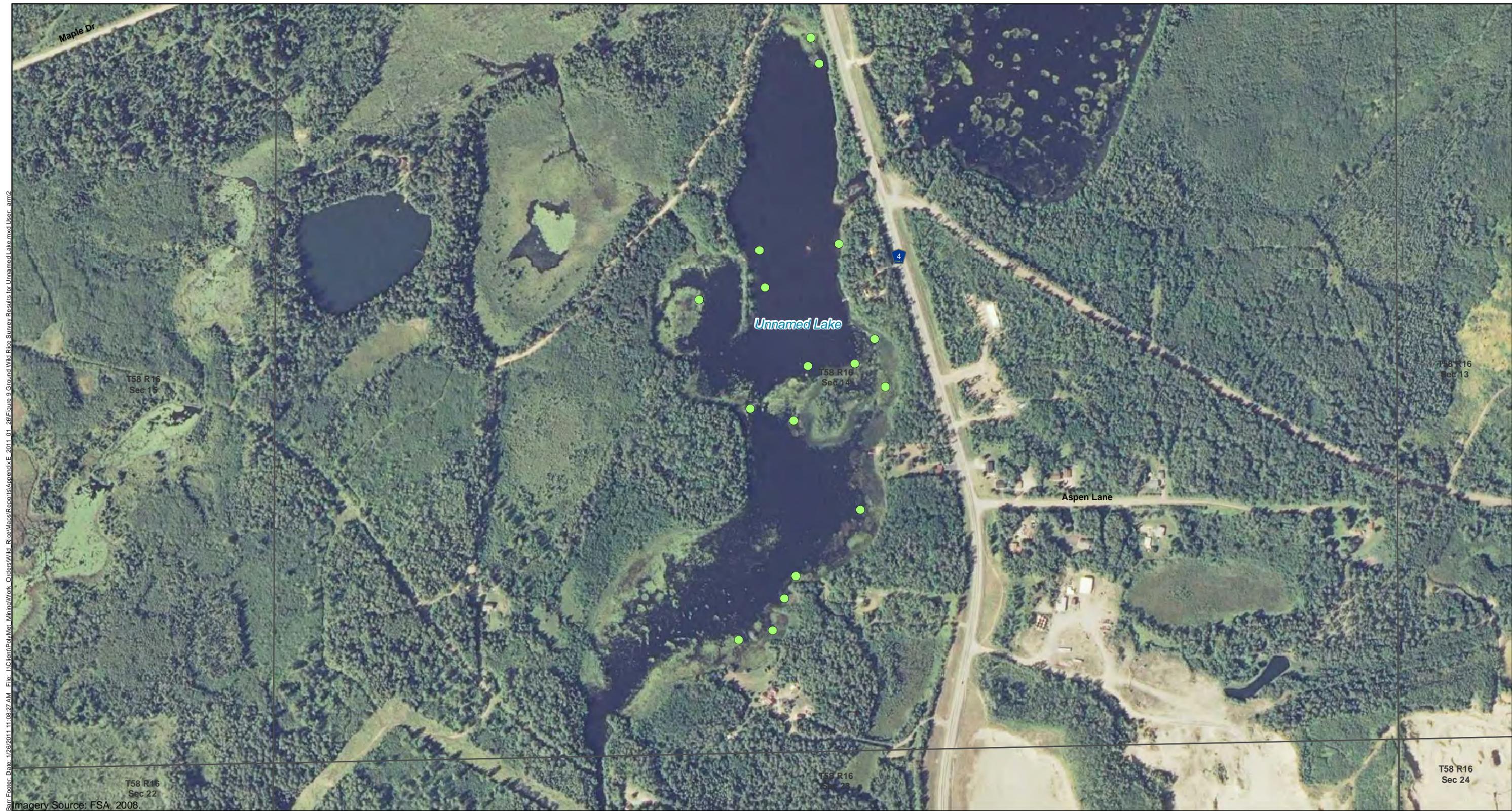


Figure 8  
 GROUND WILD RICE SURVEY RESULTS  
 FOR LOWER EMBARRASS LAKE  
 (EMBARRASS RIVER)  
 Surveyed August 13, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Barr Footer Date: 12/26/2011 11:08:27 AM File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E\_2011\_01\_26\Figure 9\_Ground Wild Rice Survey Results for Unnamed Lake.mxd User: aim2  
 Imagery Source: FSA, 2008.

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Section Boundaries

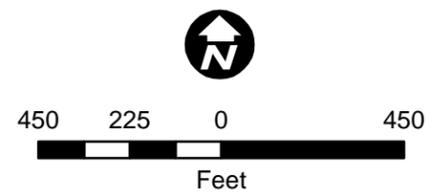
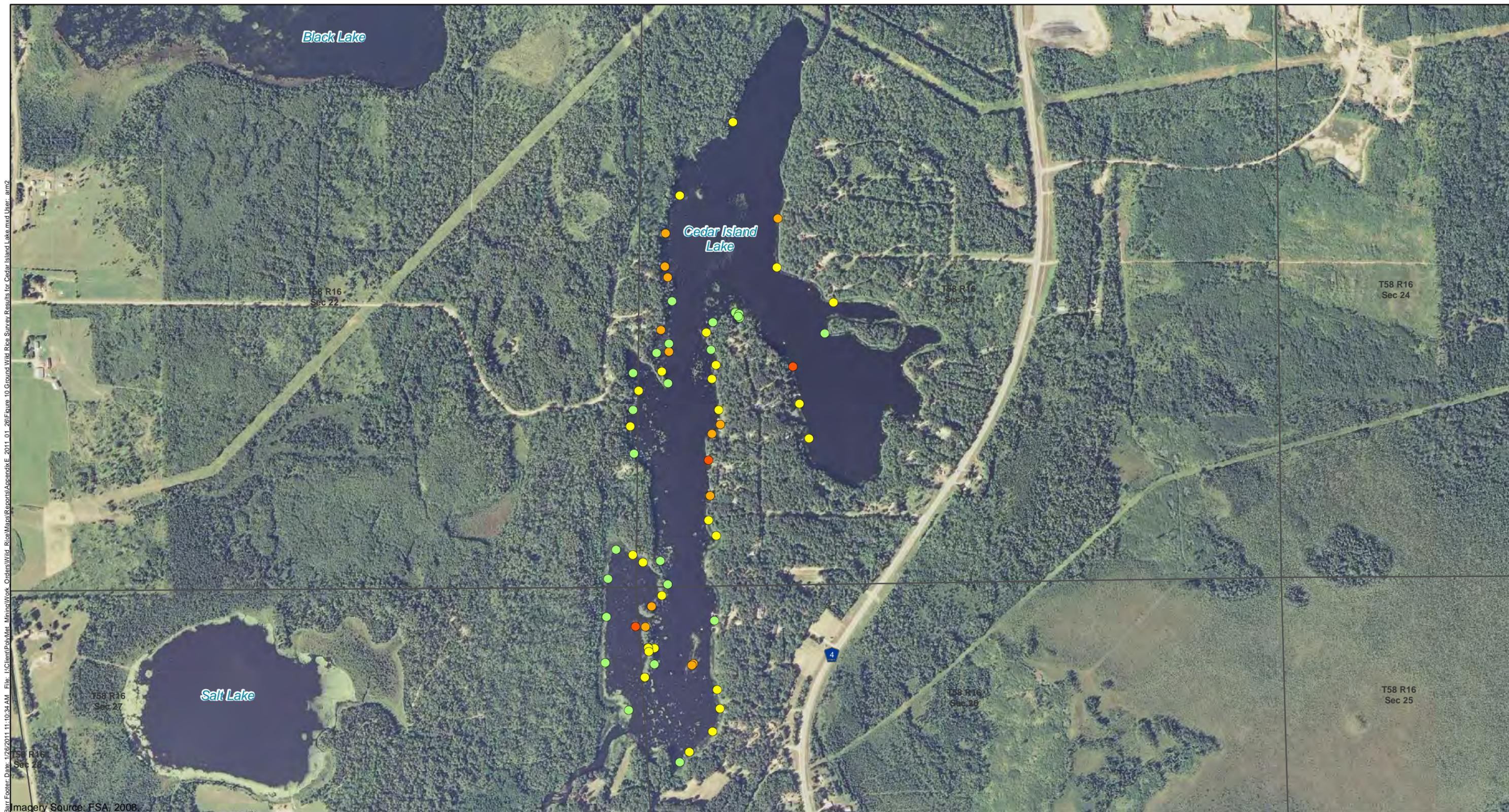


Figure 9  
 GROUND WILD RICE SURVEY  
 RESULTS FOR UNNAMED LAKE  
 (EMBARRASS RIVER)  
 Surveyed August 13, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Section Boundaries

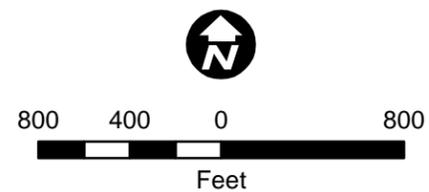


Figure 10  
 GROUND WILD RICE SURVEY RESULTS  
 FOR CEDAR ISLAND LAKE  
 (EMBARRASS RIVER)  
 Surveyed August 13, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E - 2011\_01\_26\Figure 11 Ground Wild Rice Survey Results for Esquagama Lake and Lower Embarrass River.mxd User: arm2  
 Date: 1/26/2011 11:12:43 AM  
 Imagery Source: FSA, 2008.

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage
- Section Boundaries

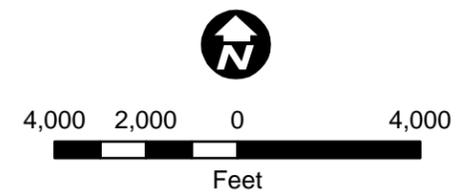
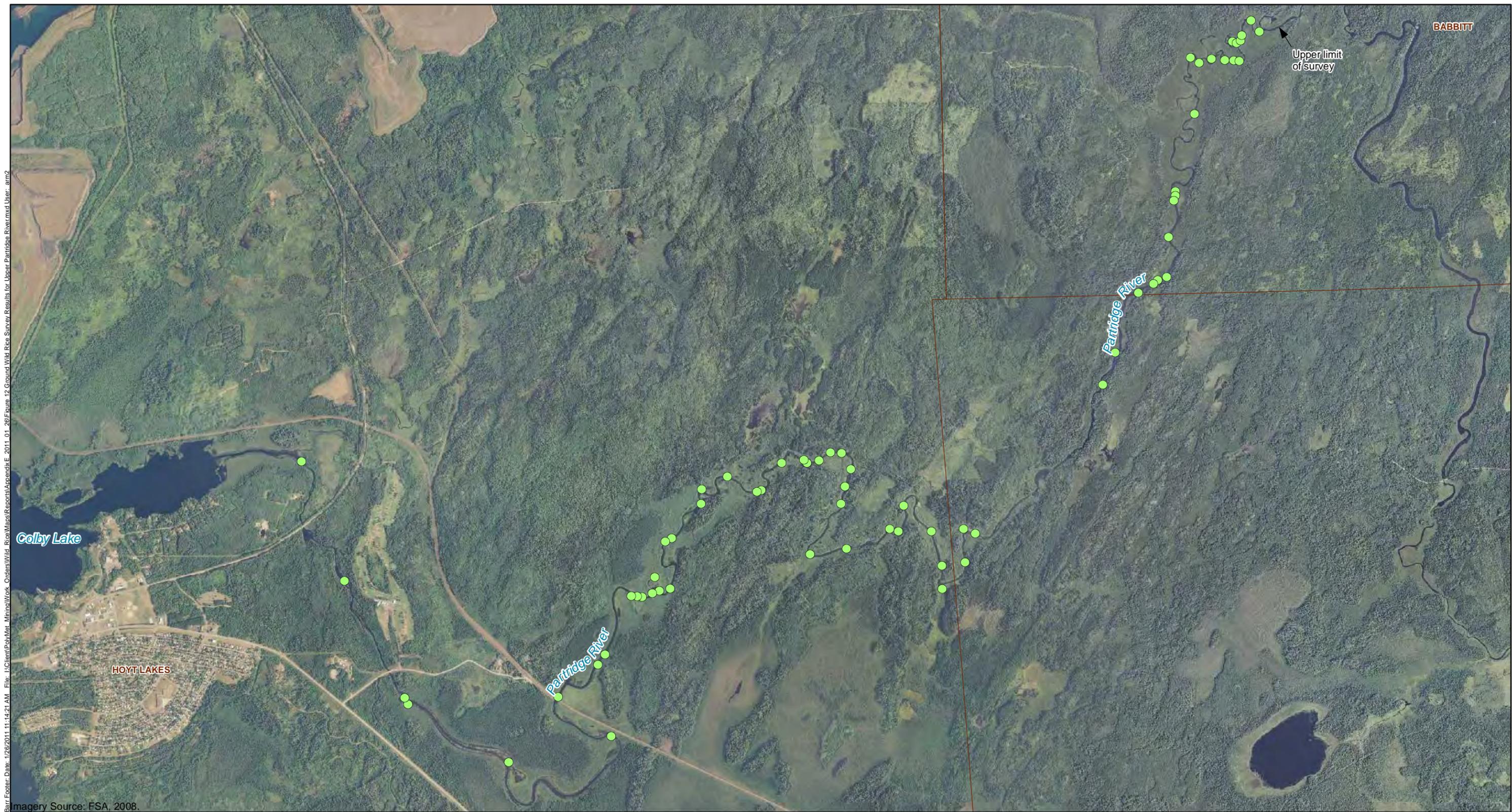


Figure 11  
 GROUND WILD RICE SURVEY RESULTS  
 FOR ESQUAGAMA LAKE, FOURTH LAKE  
 AND LOWER EMBARRASS RIVER  
 Surveyed August 18-20, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\Polymet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E - 2011\_01\_26\Figure 12 Ground Wild Rice Survey Results for Upper Partridge River.mxd User: arm2  
 Date: 1/26/2011 11:14:21 AM  
 Imagery Source: FSA, 2008.

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- City Boundaries

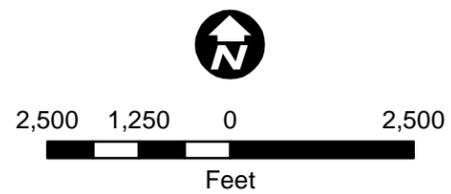


Figure 12  
 GROUND WILD RICE SURVEY RESULTS  
 FOR UPPER PARTRIDGE RIVER  
 Surveyed September 1-2, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E - 2011\_01\_26\Figure 13 Ground Wild Rice Survey Results for Colby Lake and Lower Partridge River.mxd User: arm2  
 Date: 1/26/2011 11:18:26 AM  
 Imagery Source: FSA, 2008

- Wild Rice Density**
- 1 <10% Wild Rice Coverage
  - 2
  - 3
  - 4
  - 5 >75% Wild Rice Coverage
- City Boundaries

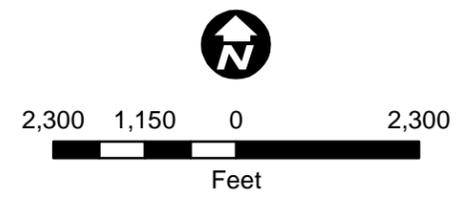
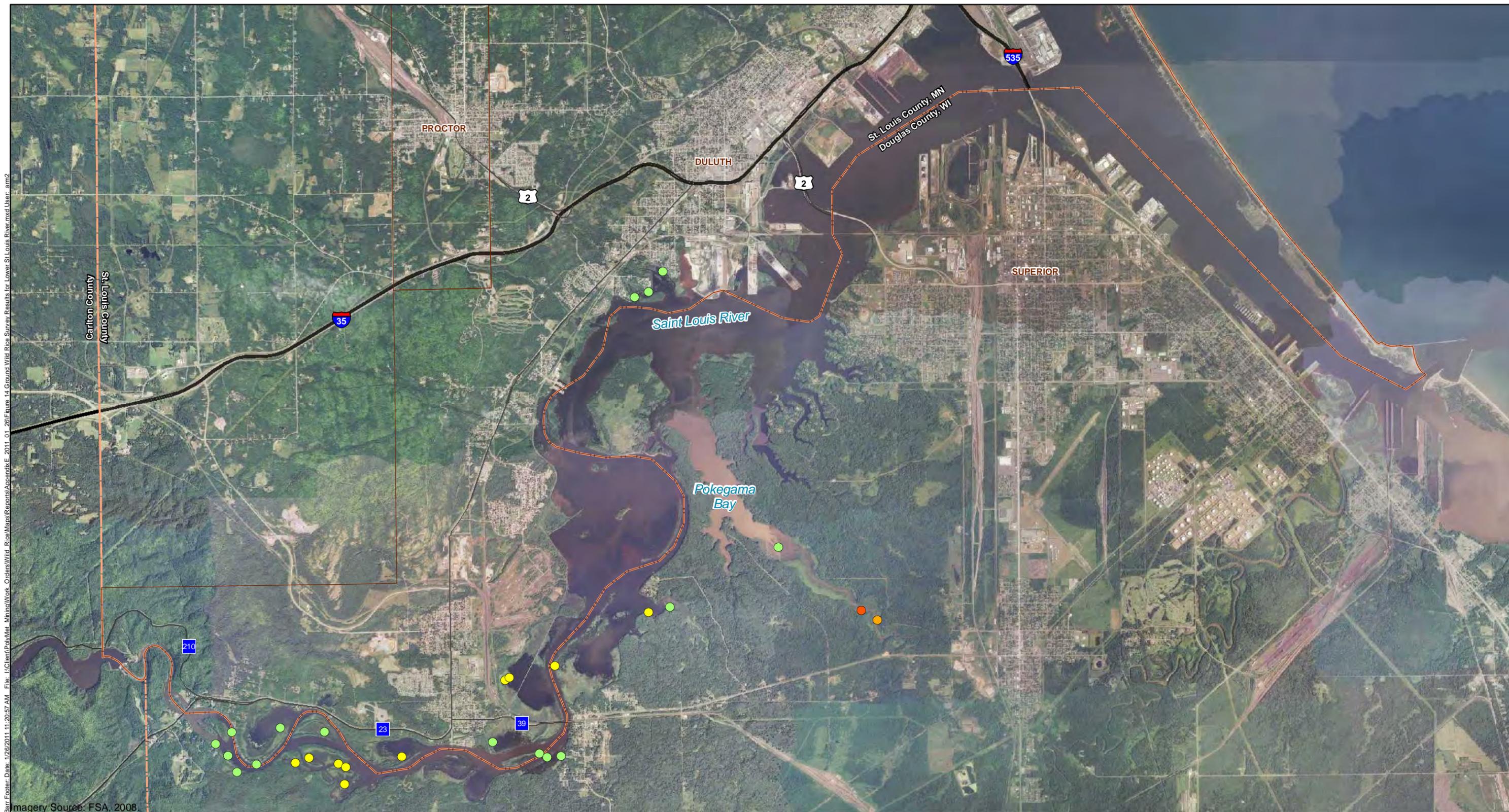


Figure 13  
 GROUND WILD RICE SURVEY RESULTS  
 FOR COLBY LAKE & LOWER PARTRIDGE RIVER  
 Surveyed August 20, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



File: I:\Client\Polymet Mining\Work Orders\Wild Rice\Maps\Reports\Appendix E - 2011\_01\_26\Figure 14 Ground Wild Rice Survey Results for Lower St. Louis River.mxd User: am2  
 Date: 1/26/2011 11:20:57 AM  
 Imagery Source: FSA, 2008

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- City Boundaries
- County Boundary

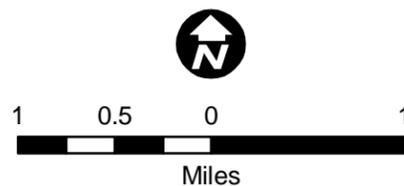


Figure 14  
 GROUND WILD RICE SURVEY RESULTS FOR  
 POKEGAMA BAY AND LOWER ST. LOUIS RIVER  
 Surveyed August 17-18, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Bar: Footer Date: 12/26/2011 11:23:53 AM File: I:\Client\PolyMet\_Mining\Work\_Orders\Wild\_Rice\Maps\Reports\Appendix E\_2011\_01\_26\Figure\_15\_Ground\_Wild\_Rice\_Survey\_Results\_for\_Hay\_and\_Rice\_Lakes.mxd User: arm2

Imagery Source: FSA, 2008.

**Wild Rice Density**

- 1 <10% Wild Rice Coverage
- 2
- 3
- 4
- 5 >75% Wild Rice Coverage
- Section Boundaries

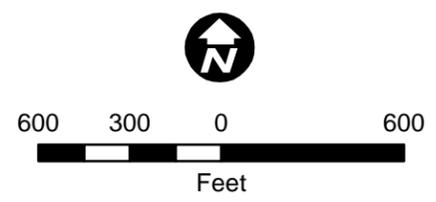


Figure 15  
 GROUND WILD RICE SURVEY RESULTS  
 FOR HAY LAKE (MN ID 69579),  
 LITTLE RICE LAKE (MN ID 69578)  
 AND PIKE RIVER  
 Surveyed August 13, 2009  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota



Barr Footer: Date: 1/26/2011 11:36:46 AM File: I:\Client\Polymet\_Minima\Work\_Orders\Wild\_Rice\Map\Reports\AppendixE\_2011\_01\_26\Figure\_16\_Grid\_Density\_Calculations\_Lower\_Embarrass\_Lake.mxd User: atm2

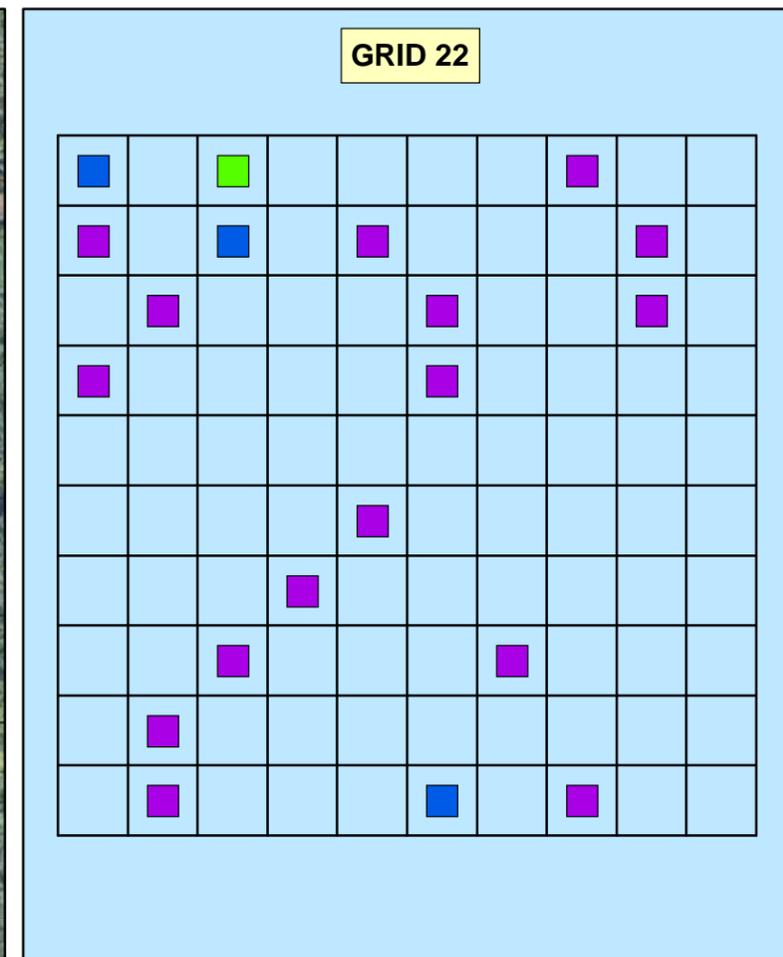


Figure 16  
**GRID DENSITY CALCULATIONS**  
**LOWER EMBARRASS LAKE**  
**(EMBARRASS RIVER)**  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Stem Density/0.5m<sup>2</sup>

- 1 - 25
- 26 - 50
- 51 - 75

— 10x10 Meter Grid

Meters



Barr Footer: Date: 1/26/2011 11:38:31 AM File: I:\Client\PolMet\_MinimWork\_Orders\Wild\_Rice\Map\Reports\AppendixE\_2011\_01\_26\Figure\_17\_Grid\_Density\_Calculations\_Unnamed\_Lake.mxd User: am2

T58 R16  
Sec 15

T58 R16  
Sec 22

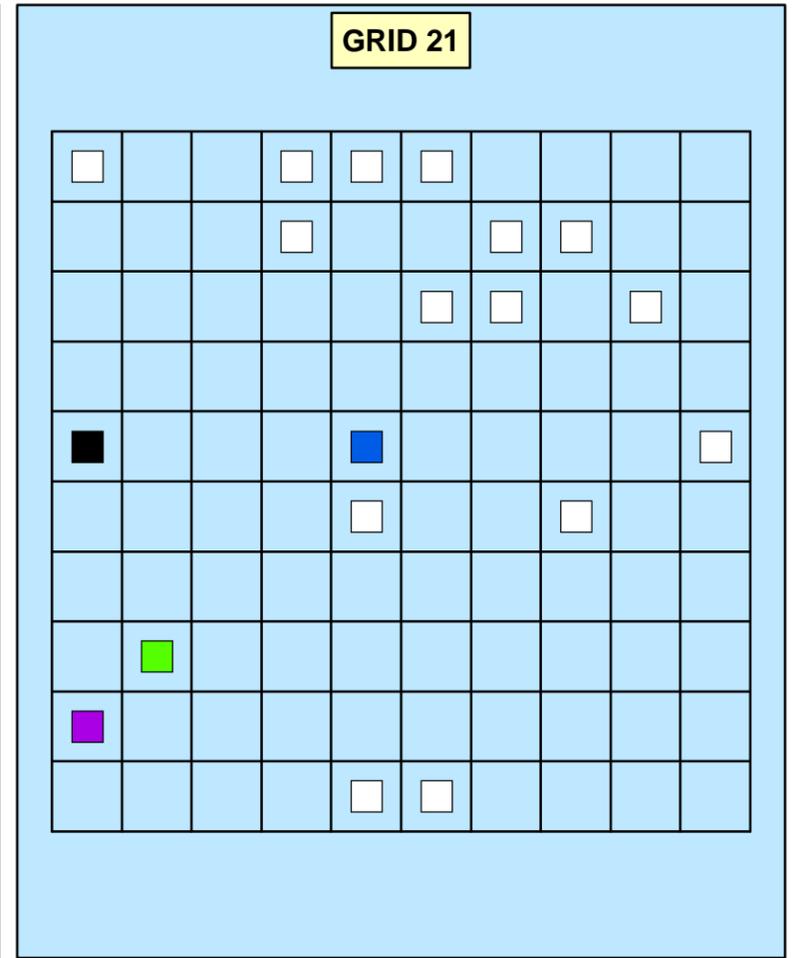
Unnamed Lake

T58 R16  
Sec 14

**GRID 21**  
20.0 Stems/0.5 Meter<sup>2</sup>  
20.9 mg/L - Sulfate

Aspen Lane

T58 R16  
Sec 23

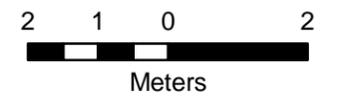


**Figure 17**  
**GRID DENSITY CALCULATIONS**  
**UNNAMED LAKE (EMBARRASS RIVER)**  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

Stem Density/0.5m<sup>2</sup>

- 0
- 1 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- >200

— 10x10 Meter Grid





**Grid 29**  
 54.0 Stems/0.5 Meter<sup>2</sup>  
 19.8 mg/L - Sulfate

**Grid 30**  
 56.9 Stems/0.5 Meter<sup>2</sup>  
 19.7 mg/L - Sulfate

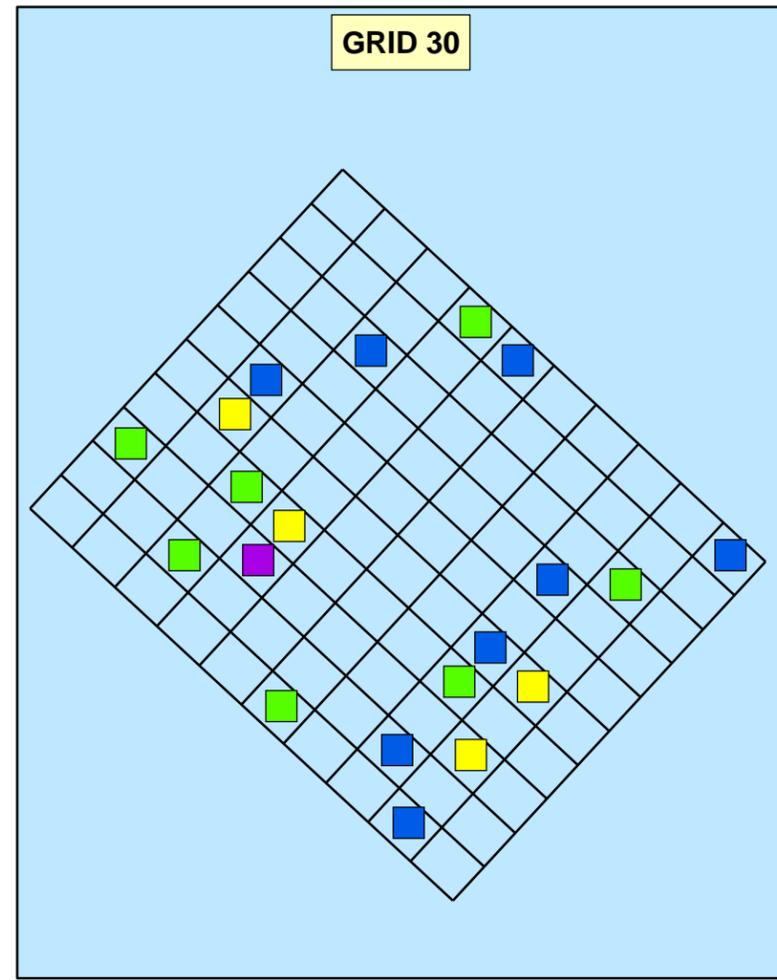
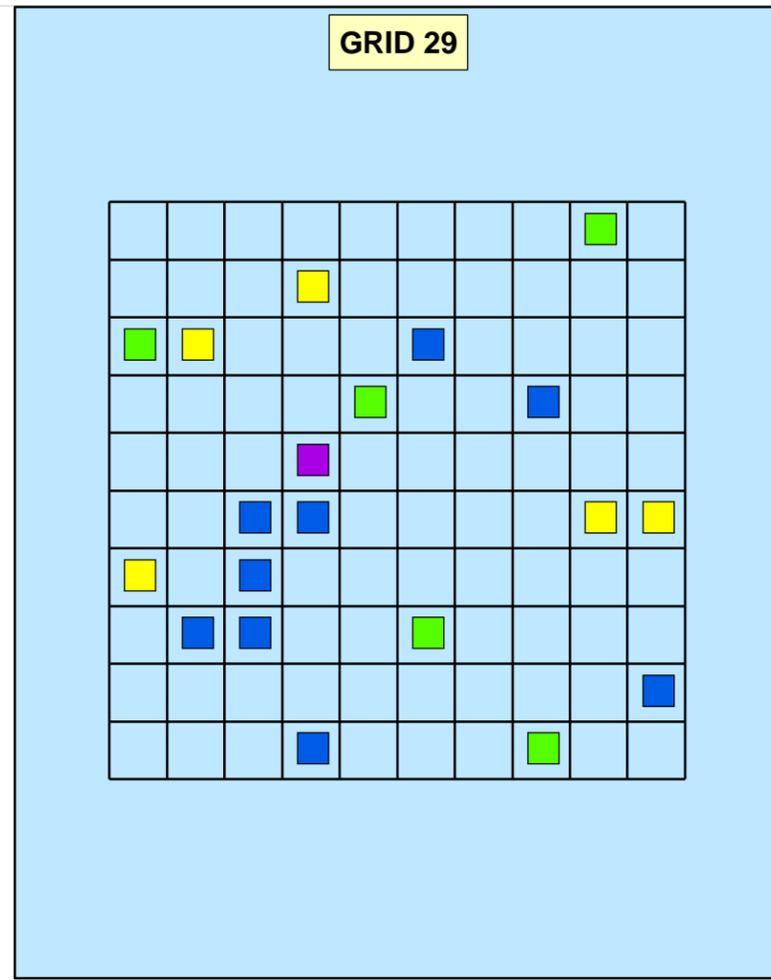
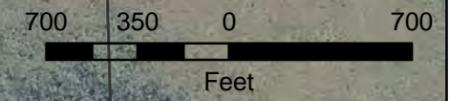
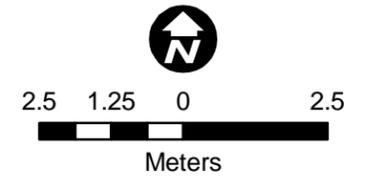
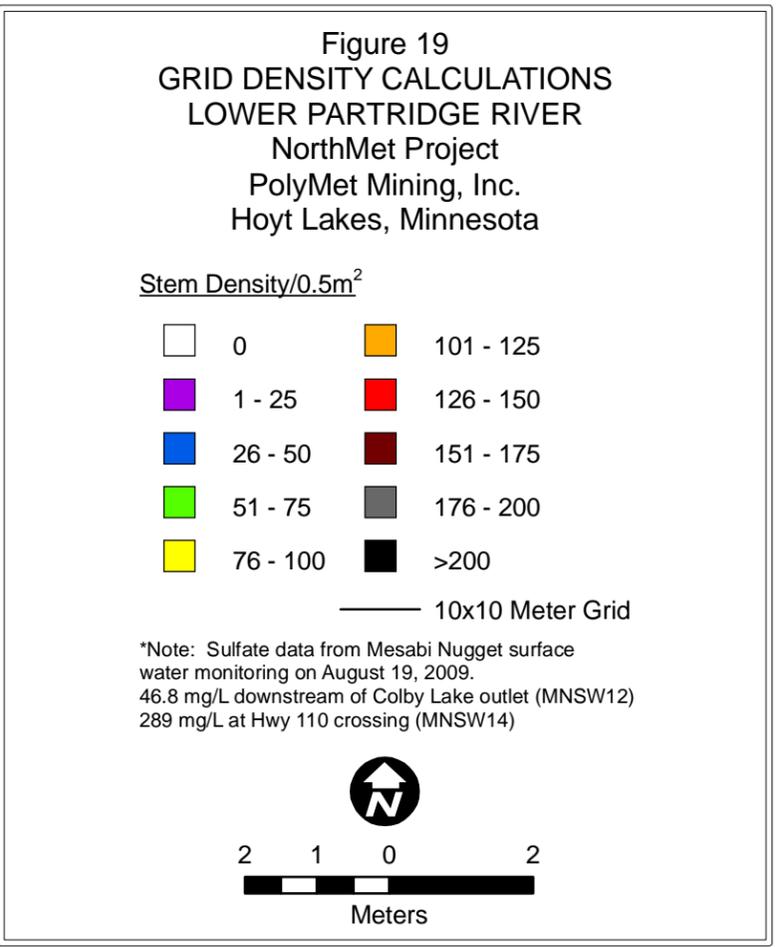
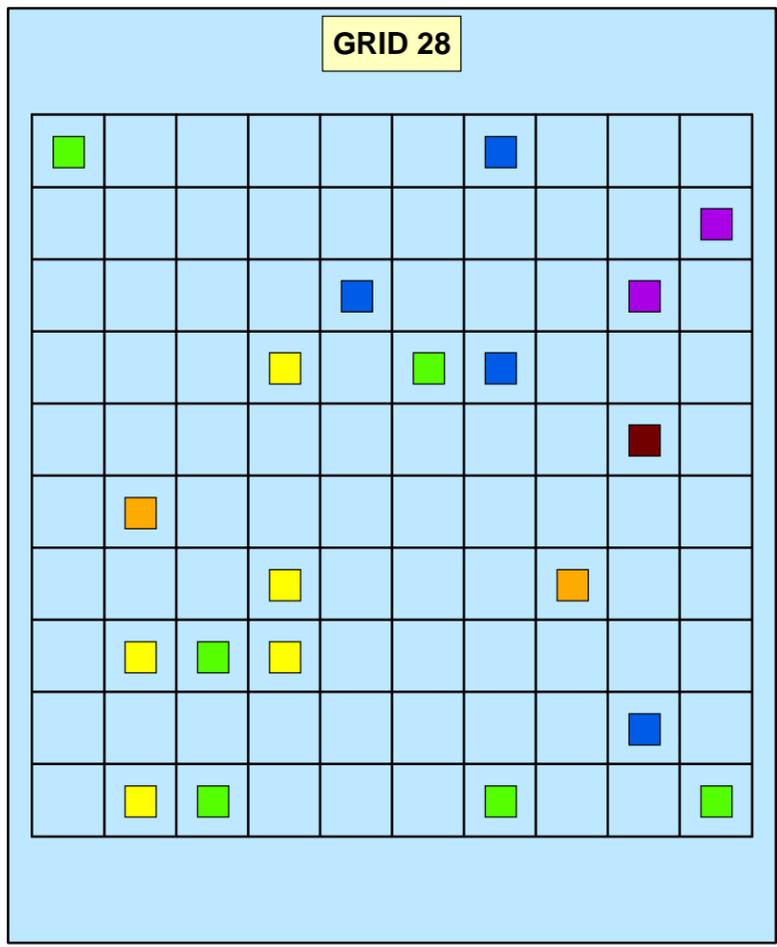
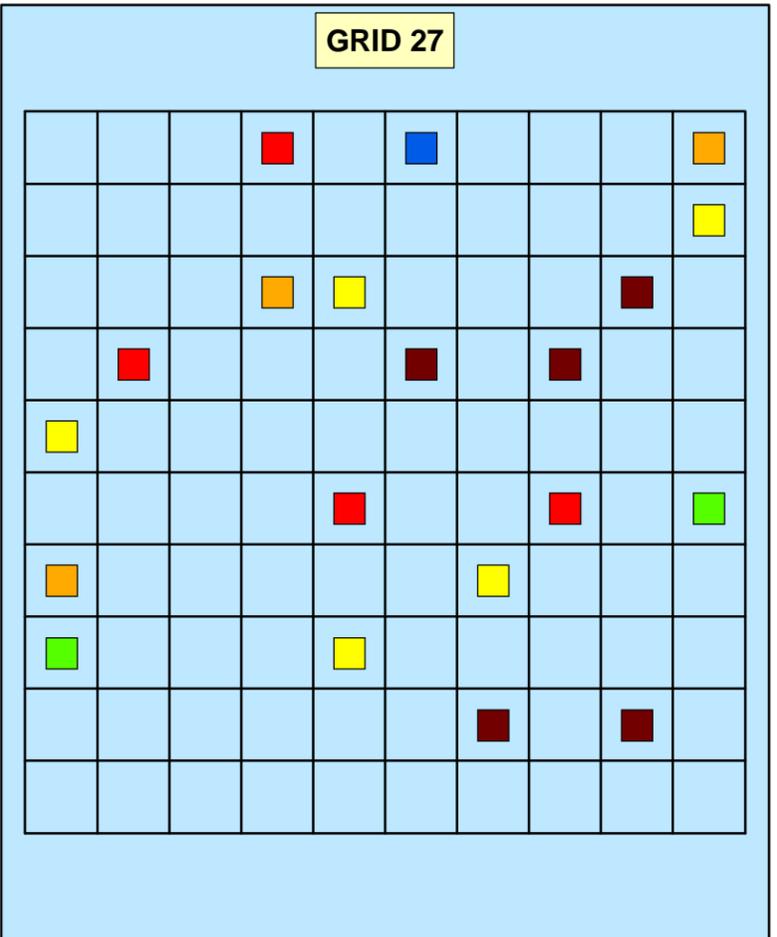
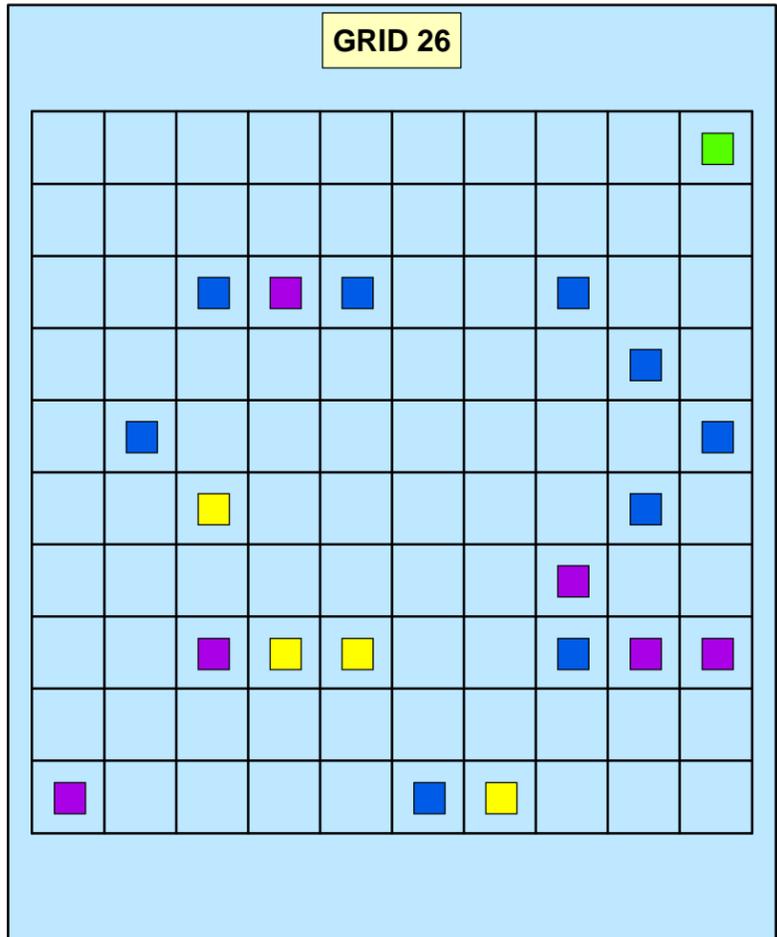


Figure 18  
 GRID DENSITY CALCULATIONS  
 CEDAR ISLAND LAKE (EMBARRASS RIVER)  
 NorthMet Project  
 PolyMet Mining, Inc.  
 Hoyt Lakes, Minnesota

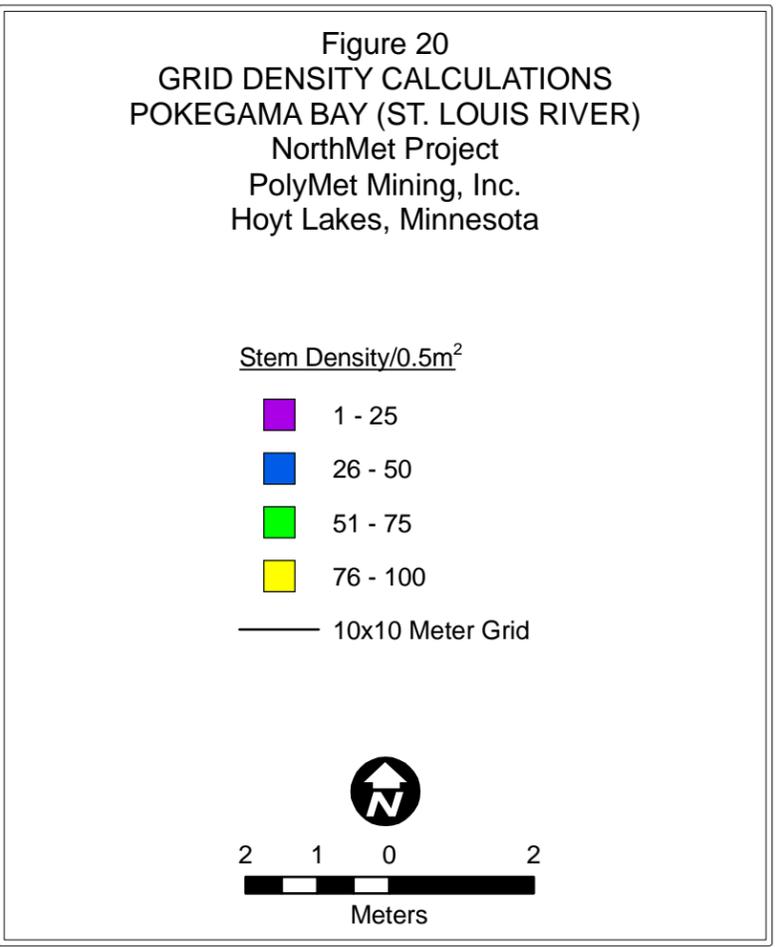
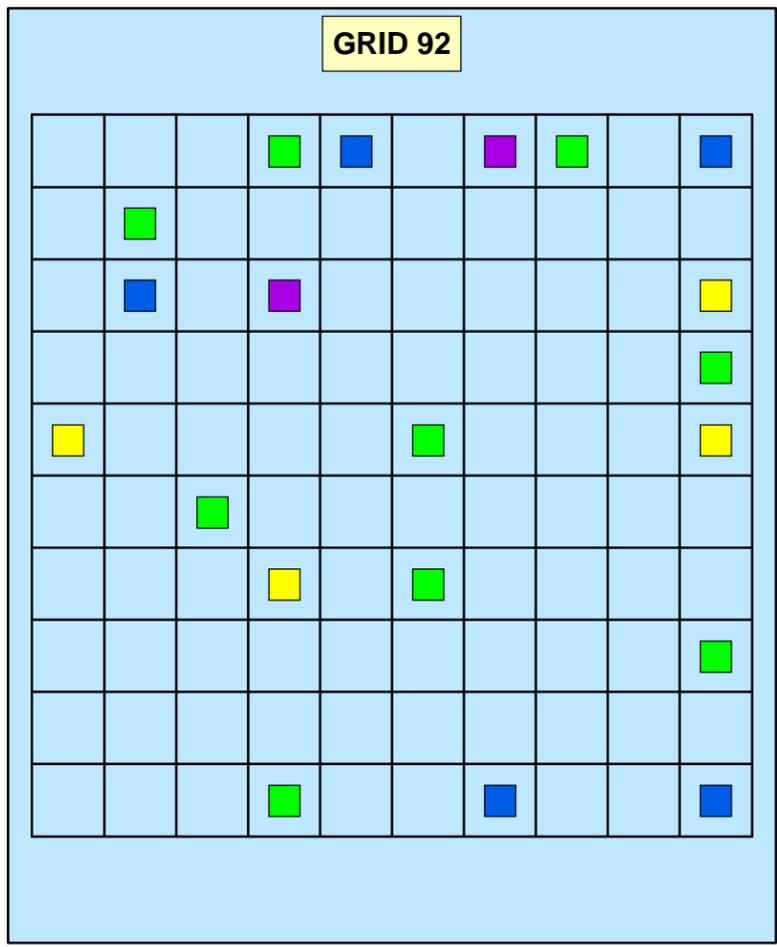
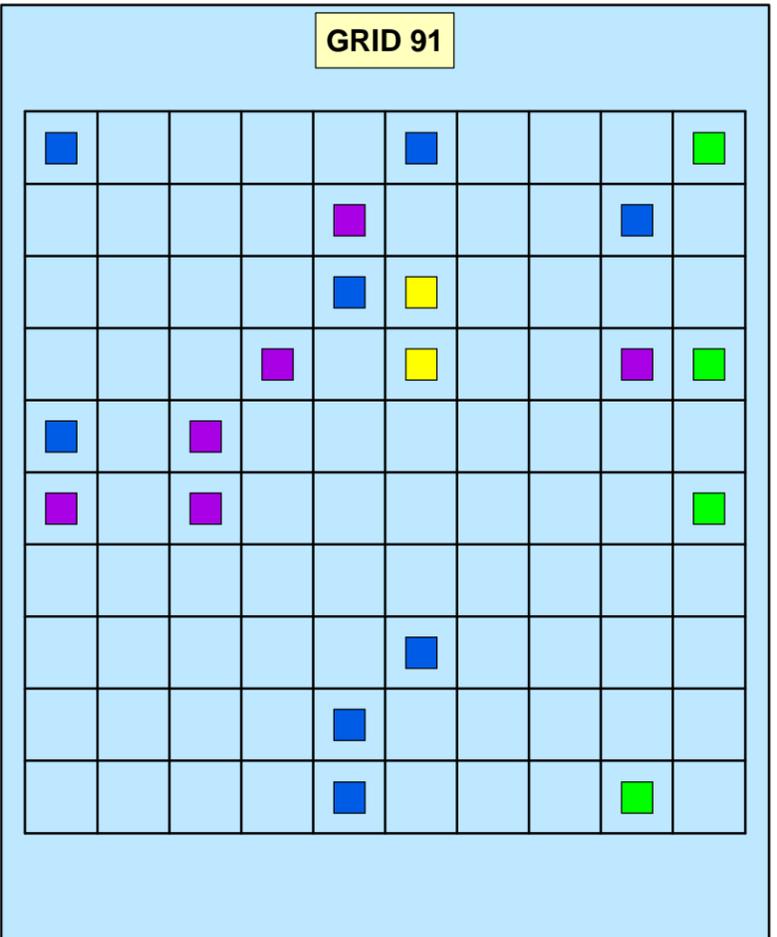
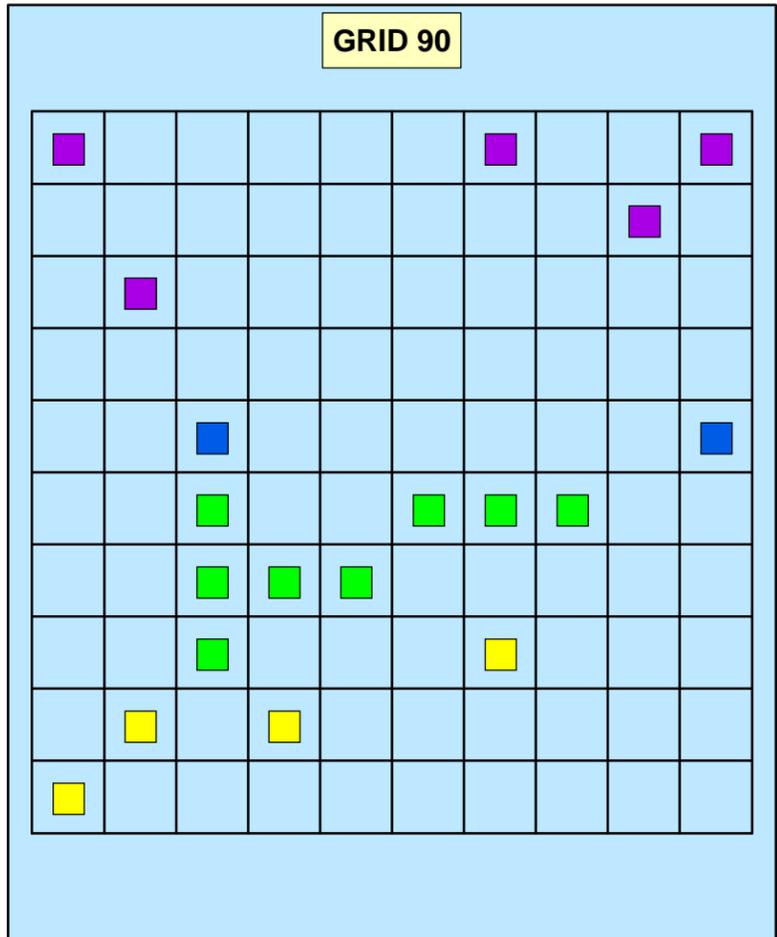
Stem Density/0.5m<sup>2</sup>

- 1 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- 10x10 Meter Grid





Barr Footer: Date: 1/26/2011 11:43:09 AM File: I:\Client\Polymet\_Minima\Work\_Orders\Wild\_Rice\Map\Reports\AppendixE\_2011\_01\_26\Figure\_19\_Grid\_Density\_Calculations\_Lower\_Partridge\_River.mxd User: jim2



Barr Footer: Date: 1/26/2011 11:44:44 AM File: I:\Client\Polymet\_Mining\Work\_Orders\Wild\_Rice\Map\Reports\AppendixE\_2011\_01\_26\Figure\_20\_Grid\_Density\_Calculations\_Pokegama\_Bay\_St\_Louis\_River.mxd User: am2

