

Prepared for:  
PolyMet Mining Incorporated  
Hoyt Lakes, Minnesota

# Wetland, Lake Shoreline, Stream Frontage, and Floodplain Assessment for the Proposed PolyMet Land Exchange Final

AECOM Environment  
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# Contents

1.0	Introduction and Purpose of Report.....	1-1
2.0	Findings .....	2-1
3.0	Recommendations .....	3-1
3.1	Recommendations Based on Current List of Parcels .....	3-1
3.2	Options to Reduce Floodplain Loss.....	3-1
4.0	Analysis Area .....	4-1
4.1	U.S. Forest Service Lands .....	4-1
4.2	Private Lands.....	4-1
5.0	Methods Used to Estimate Wetland and Floodplain Acreage and Functions and Values .....	5-1
5.1	Wetland Acreage.....	5-1
5.1.1	U.S. Forest Service Lands .....	5-1
5.1.2	Private Lands.....	5-2
5.2	Wetland Functions and Values .....	5-2
5.2.1	U.S. Forest Service Lands .....	5-2
5.2.2	Private Lands.....	5-3
5.3	Lake Acreage and Shoreline Distance and Stream Frontage .....	5-3
5.4	Floodplain Acreage and Functions and Values .....	5-3
6.0	Wetland and Floodplain Assessment Results .....	6-1
6.1	Wetland Acreage Assessment.....	6-1
6.1.1	U.S. Forest Service Lands .....	6-1
6.1.2	Private Lands.....	6-1
6.2	Wetland Functions and Values .....	6-1
6.2.1	U.S. Forest Service Parcels .....	6-1
6.2.2	Private Lands.....	6-2
6.3	Lake Acreage and Shoreline Distance and Stream Frontage .....	6-2
6.3.1	U.S. Forest Service Lands .....	6-2
6.3.2	Private Lands.....	6-2
6.4	Floodplain Acreage and Functions and Values .....	6-3
6.4.1	U.S. Forest Service Lands .....	6-3
6.4.2	Private Lands.....	6-3

7.0	References .....	7-1
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## List of Appendices

A.	Summary of Wetland, Lake, Stream, an Floodplain Acreage, Length, and Frontage for Federal Parcel .....	A-1
B.	Summary of Wetland, Lake, Stream, an Floodplain Acreage, Length, and Frontage for Nonfederal Parcels .....	B-1
C.	Wetland Mapping of the Federal Parcels (St. Louis County) Proposed for Exchange .....	C-1.
D.	National Wetland Inventory Mapping of the Nonfederal Parcels (Cook, Lake, and St. Louis counties) Proposed for Exchange .....	D-1
E.	Floodplain mapping of the Federal Parcel (St. Louis County) Proposed for Exchange .....	E-1
F.	Floodplain Mapping of the Nonfederal Parcels (Cook, Lake, and St. Louis counties) Proposed for Exchange .....	F-1

## List of Figures

1.	Land Exchange Parcels .....	1-3
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## 1.0 Introduction and Purpose of Report

This report documents: 1) a wetland acreage and function and value analysis, 2) a lake shoreline and stream frontage analysis, and 3) a floodplain analysis for the proposed exchange of approximately 6,518 acres of federal land for approximately 7,075 acres of nonfederal lands to be purchased by Polymet Mining Incorporated (PolyMet). Federal lands involved in the exchange are U.S. Forest Service (Forest Service)-administered lands located in eastern St. Louis County, while private lands are located in Cook, Lake, and St. Louis counties, Minnesota (**Figures 1**). Acreages given in this report are based on Geographic Information System (GIS) mapping and analysis.

This report is intended to be included with National Environmental Policy Act (NEPA) documentation regarding the proposed land exchange.





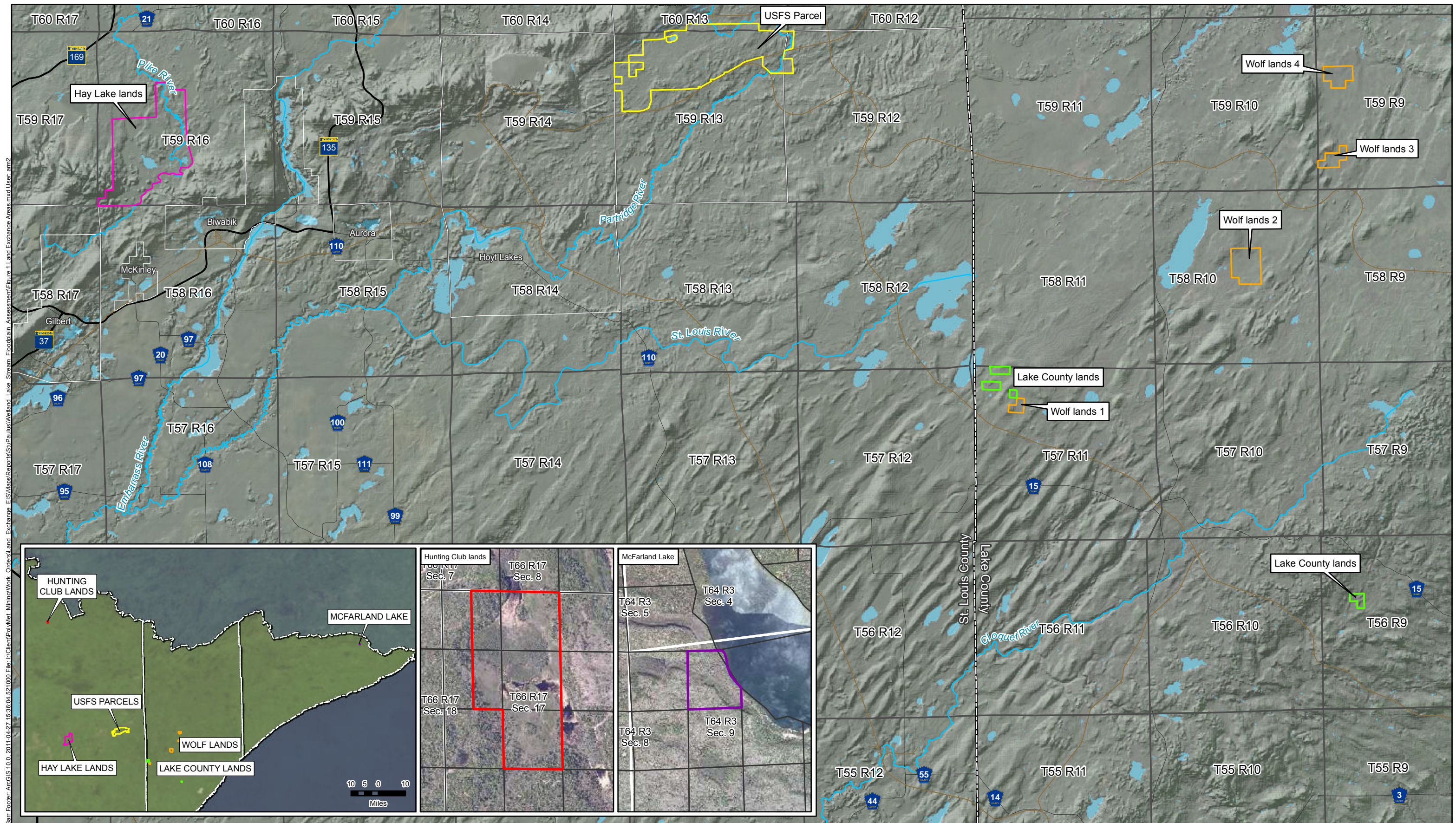


Figure 1  
 LAND EXCHANGE PARCELS  
 PolyMet Mining Inc.  
 Hoyt Lakes, MN





## 2.0 Findings

If the proposed land exchange is completed in full (i.e., all parcels shown on the lists and maps attached are conveyed):

1. **There would be a net wetland acreage gain of 602 acres to the federal estate.** Federal land includes approximately 4,069 acres of wetland. Nonfederal land includes approximately 4,671 acres of wetland.
2. **There would likely be a net wetland function gain to the federal estate.** This net gain of function would result from the 602-acre net gain in the area of wetlands under federal management.
3. **There would likely be minor gain in wetland function to the environment as a whole.** Lands on the Forest Service parcel that PolyMet proposes to acquire are currently subject to low-intensity forest management by the Forest Service. Following the land exchange, these lands would be managed by PolyMet and about 737 acres of wetlands would be subject to higher-intensity management, resulting in wetland function loss. However, approximately 3,332 acres (82 percent) of wetlands on the Forest Service parcel would not be subject to low-intensity forest management in the future and would take on, over time, characteristics of mature, relatively undisturbed wetlands. In addition, the 4,671 acres of wetlands on nonfederal lands would be subject to low-intensity forest management by the Forest Service and would likely become more functional over time.
4. **There would be a net gain of 97 acres of lake habitat and a net gain of 12,289 feet of lake shoreline habitat to the federal estate.** Federal land includes approximately 32 acres of lake habitat and 4,680 feet of lake shoreline habitat associated with Mud Lake. Nonfederal land includes approximately 129 acres of lake habitat and 16,463 feet of lake shoreline habitat associated with Hay Lake, Little Rice Lake, and an unnamed lake on the Hay Lake parcel, and 506 feet of lake shoreline habitat associated with McFarland Lake and the McFarland parcel. Based on an index of number of feet of frontage, there would be an approximately 3.6-fold gain in shoreline habitat to the federal estate.
5. **There would be a net gain of 4.1 river/creek miles and a 2-fold increase in associated river/creek riparian habitat to the federal estate.** Federal land includes approximately 5.3 miles of river habitat associated with Yelp Creek and the Partridge River. Nonfederal land includes approximately 8.2 miles of river habitat associated with the Pike River and 1.2 miles of river habitat associated with Coyote Creek. Based on the number of frontage feet, there would be an approximately 1.6-fold increase in riparian habitat to the federal estate.
6. **There would be a net loss of 1,360 acres of floodplain to the federal estate.** Federal land includes approximately 1,845 acres of floodplain associated with Yelp Creek and the Partridge River. Nonfederal land includes approximately 373 acres of floodplain associated with the Pike River and 112 acres associated with Coyote Creek.



## 3.0 Recommendations

### 3.1 Recommendations Based on Current List of Parcels

1. Any changes (additions, deletions, substitutions, etc.) to the list of parcels will render the above-listed findings no longer accurate. If such changes are made, the wetland and floodplain analysis should be re-done based on the revised lists of parcels.

### 3.2 Options to Reduce Floodplain Loss

1. The following options are available for ensuring future protection of floodplains and minimization of floodplain-associated risk on the federal parcels:
  - (a) Rely on existing county, state, and federal regulatory shoreline controls to provide protection to the floodplains being conveyed from federal to private ownership on lands that would not be impacted by the proposed NorthMet Mine Project. None of the floodplain acreage being conveyed from federal to private ownership would be disturbed by the proposed project. Controls include those associated with: State and Local Shoreland Management Regulations, the Minnesota Department of Natural Resources Protected Waters permitting, the Minnesota Wetland Conservation Act, and U.S. Army Corps of Engineers permitting under Section 404 of the Clean Water Act.
  - (b) Add a clause to the deed of each federal parcel with flood hazard acreage that is eventually involved in the exchange. The deed clause should identify the presence of designated flood hazard areas and should reference relevant laws, rules and regulations (such as those identified in the bullet immediately above) that may provide some measure of floodplain protection or flood risk minimization.



## 4.0 Analysis Area

### 4.1 U.S. Forest Service Lands

The U.S. Forest Service exchange lands (Exchange Lands) consist of the proposed mine site (Mine Site) and adjoining lands (Additional Parcel), and encompasses 6,518 acres in eastern St. Louis County, Minnesota. The Mine Site and Additional Parcel are located at the eastern end of the Mesabi Iron Range (Figure 1).

The Mine Site is 6 miles south of the village of Babbitt, Minnesota. It is 1.5 to 2 miles south of the active Northshore Mining Company open-pit taconite mine and 8.3 miles east of Cliffs Erie's former open-pit taconite mine and processing operations (**Figure 1**). The Mine Site is connected to the Plant Site by a private railroad and a segment of the private Dunka Road. PolyMet has acquired ownership or the right to use additional lands, trackage, and other railroad assets to secure the access between the Mine Site and the Plant Site. The Mine Site encompasses approximately 2,801 acres in all or portions of: Township 59 North, Range 13 West, Sections 1, 2, 3, 4, 9, 10, 11, and 12 in St. Louis County, Minnesota. Of these, approximately 2,620 acres are administered by the Forest Service. The property is zoned for mining, and PolyMet has a 100 percent leasehold interest in the property. The mineral rights are owned by RGGS Inc., and the majority of the surface is managed by the Forest Service, with smaller portions owned by PolyMet, Allete, Cliffs Erie (Cleveland-Cliffs, Inc.), and the State of Minnesota. The Mine Site, which is in a previously logged forest area, is located in the Partridge River drainage, about 3 miles south of Iron Lake and the Laurentian Divide. The Partridge River is in the watershed of the East St. Louis River, which discharges into Lake Superior.

The Additional Parcel is approximately 3,898 acres and is east, west, and north of the Mine Site and is administered by the Forest Service (**Figure 1**). The Additional Parcel includes all or portions of: Township 59 North, Range 12 West, Sections 6 and 7; Township 59 North, Range 13 West, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 17, and 18, and Township 60 North, Range 13 West, Sections 33, 34, 35, and 36. Much of the Additional Parcel consists of wetlands and includes a portion of One Hundred Mile Swamp.

### 4.2 Private Lands

The private lands consist of the Hay Lake, Hunting Club, Lake County, McFarland and Wolf Land parcels (**Figure 1**). The Hay Lake parcel is in central St. Louis County, approximately 3 miles west of Biwabik, Minnesota. The parcel, located at the eastern end of the Mesabi Iron Range, includes approximately 4,926 acres in all or portions of Sections 9, 16, 19, 20, 21, 27, 28, 29, 30, 31, and 32 in Township 59 North, Range 16 West.

The Hunting Club Parcel is in northern St. Louis County, and includes approximately 160 acres in Section 17, Township 66 North, Range 17 West. The parcel is nearly level and consists predominantly of second- or third-growth deciduous and mixed deciduous and coniferous forest uplands and emergent, scrub-shrub, and forested wetlands.

The Lake County parcels consists of approximately 382 acres, with 265 acres in Sections 5 and 6, Township 57 North, Range 11 West (Lake County North), and 117 acres in Section 17, Township 56 North, Range 9 West (Lake County South) in Lake County, Minnesota. The parcels are nearly level and consist predominantly of second- or third-growth mixed deciduous and coniferous forest uplands and bog, emergent, scrub-shrub, and forested wetlands. Much of the Lake County South Parcel was recently logged.

The McFarland parcel consists of approximately 31 acres in Section 9, Township 64 North, Range 3 East, in Cook County, Minnesota. It is approximately 3 miles west of the U.S.-Canada border.

The Wolf Land parcels total 1,576 acres and are comprised of 126 acres in Section 8, Township 57 North, Range 11 West (Wolf Land 1); 768 acres in Sections 15 and 22, Township 58 North, Range 10 West (Wolf Land 2); 277 acres in Sections 30 and 31, Township 59 North, Range 9 West (Wolf Land 3); and 405 acres in Sections 7, 8, 15, 17, and 18, Township 59 North, Range 9 West (Wolf Land 4) in Lake County, Minnesota. The parcels are nearly level and consist predominantly of second- or third-growth mixed deciduous and coniferous forest uplands and bog, emergent, scrub-shrub, and forested wetlands. Much of Wolf Land 3 has been recently logged.



## 5.0 Methods Used to Estimate Wetland and Floodplain Acreage and Functions and Values

### 5.1 Wetland Acreage

Wetland acreage on the Forest Service and private lands parcels was determined using U.S. Geological Survey (USGS) topographic and U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps, aerial photographs, soil survey data, and field investigations.

#### 5.1.1 U.S. Forest Service Lands

Wetlands on the Forest Service parcel were evaluated during 2004-2008 surveys by ENSR International (ENSR), Barr Engineering Company (Barr), and AECOM (formerly ENSR). Wetlands on the proposed mine project site were initially mapped in June 2004 by ENSR based on a general field survey of the area for wetland and uplands habitats used by fish and wildlife (ENSR 2005). The survey area was approximately 3,015 acres and the location and boundaries of wetlands were determined based primarily on vegetative and hydrologic characteristics of the sites (wetland boundaries were not delineated using Global Positioning System [GPS]). Wetland and upland plant communities were mapped on 1997 infrared aerial photographs of the site.

To better identify the location and boundaries of wetlands on the proposed mine project site, Barr overlaid the wetland and upland habitat map produced by ENSR with information on soils, 2-foot topography, and infrared, true-color, and black-and-white aerial photographs (Barr 2006). Barr also reviewed NWI maps of the proposed mine site. Barr found that the NWI maps did not adequately characterize wetlands found in forested areas and that the amount of wetland acreage on the site was likely underestimated based on NWI mapping. Based on this information, Barr produced field maps for wetland delineation efforts in the vicinity of the proposed mine site.

In August 2004, Barr visited the proposed mine site to refine the wetland mapping done by ENSR and to field characterize and map wetland boundaries on approximately 4,300 acres (Barr 2006). These included lands surveyed by ENSR and lands that extended beyond the proposed mine project boundary. Approximately 25 percent of the area was surveyed for wetlands. Wetland boundaries were identified using the *1987 Corps of Engineers Wetland Delineation Manual* routine wetland delineation procedures (Environmental Laboratory 1987). Wetland boundaries were field-mapped using GPS, aerial photographic interpretation, topography, and soils information. In June 2005 and July 2006, Barr field verified and delineated wetlands on an additional 70 percent of the 4,300-acre mine study area using the same procedures as used in 2004 (Barr 2006).

In 2007 to 2010, Barr evaluated wetlands on approximately 2,420 acres within the Additional Parcel that were not evaluated as part of the 2004-2006 studies (Barr 2007). Wetlands in this area were identified from field studies and aerial interpretation. Along the Dunka Road and other possible transportation routes, Barr conducted field studies to determine wetland boundaries, vegetation cover types, and plant species composition of wetlands identified in this area. For areas outside of the Dunka Road and possible transportation routes, wetlands were mapped primarily based on the presence of photographic signatures with limited field truthing and GPS locating.

In August 2008, AECOM conducted upland and wetland habitat surveys of the Additional Parcel. Wetlands were mapped based on aerial photographic interpretation and field studies (AECOM 2009). Wetlands on the Additional Parcel were identified, characterized, and mapped concurrently with the wildlife habitat assessment. Initially, potential wetland locations were determined by reviewing color infrared aerial photographs, USGS topographic maps, and wetland maps prepared by Barr (2007). Aerial photographs

were used to create large maps for use in the field. Infrared aerial photographs were reviewed to identify areas of similar vegetative cover. Aerial photographs and field maps were then used in the field to verify cover types. Upon completion of field studies, cover types were mapped as habitat polygons, and polygons were digitized using GIS and overlaid onto habitat maps created from aerial photographs (see Maps 1 and 2 in AECOM 2009). These maps and the associated GIS database were used to determine the approximate acreage of each wetland type.

In 2010 and 2011, Barr completed a baseline wetland type evaluation as part of the wetland review process for the Environmental Impact Statement for the NorthMet Project. Wetlands were evaluated and classified in the areas around the Mine Site and the Tailings Basin using the Eggers and Reed (1997) community classification system. The evaluation included reviewing imagery using 2005 color infrared photography, an aerial flight by helicopter, and additional fieldwork (Barr 2011).

Wetland surveys were conducted along transects located on primary (site access roads, drill pad access roads, logging roads) and secondary (skid trails, stream corridors, wetlands, other natural corridors) access routes to maximize the amount of area covered during the survey period. Additional surveys were conducted off of the primary and secondary access routes in an effort to better determine wetland boundaries and types. Approximately 945 acres of upland and 2,953 acres of wetland habitat were mapped on the Additional Parcel. Forty wetlands, or portions of wetlands, were evaluated for their functions and values; all wetlands were rated high value.

#### 5.1.2 Private Lands

Wetland boundaries and community types on the Hay Lake, Hunting Club, Lake County, McFarland and Wolf Land parcels were identified using methods similar to those used for the Forest Service parcels (AECOM 2010, 2011). Infrared and true color aerial photographs and topographic maps of the parcels were reviewed to identify areas that could have wetlands based on vegetative characteristics and topography. In addition, wetlands identified by the NWI were overlaid onto aerial photographs to assist in wetland identification. No field studies were conducted for this initial assessment. However, field studies were conducted in June 2009 (Hay Lake and McFarland parcels) and November 2010 (Hunting Club, Lake County, and Wolf Land parcels) to better delineate wetland boundaries on the parcels using the same methods as used for the Additional Parcel. Information from these studies was used to modify the NWI wetland types and boundaries, which were used for this analysis.

### 5.2 Wetland Functions and Values

Wetlands provide many important functions, including fish and wildlife habitat, flood/stormwater attenuation, maintenance and improvement of water quality, groundwater recharge, and aesthetic, recreation, education, and cultural benefits for humans. Several methodologies have been developed nationally to assess wetland functions and values. The Minnesota Routine Assessment Methodology for Evaluating Wetland Functions (MnRAM) was developed by the Minnesota Board of Water and Soil Resources (2007) to assess wetland functions and values in Minnesota.

#### 5.2.1 U.S. Forest Service Lands

Barr used the *Minnesota Routine Assessment Method for Evaluating Wetland Functions, Version 3.0* (MnRAM 3.0), an assessment tool designed to assess functions and values of Minnesota wetlands, to assess wetland functions and values on the Forest Service parcel (Barr 2006). Information on the functions and values of each wetland community within the proposed 4,300-acre mine project area was gathered by Barr during wetland surveys in 2005 and 2006 and included: 1) plant cover and types; 2) plant community diversity and interspersions; 3) outlet characteristics; 4) watershed and adjacent upland land uses and condition; 5) soil condition; 6) erosion and sedimentation; and 7) past and present human disturbance. Based on this assessment methodology, wetlands were rated high, medium, or low. In 2007, Barr used the

general guidelines in the *Minnesota Routine Assessment Method for Evaluating Wetland Functions, Version 3.1* (MnRAM 3.1) to assess wetland functions and values on the portions of the Forest Service parcel located outside of the proposed mine project area (Barr 2007; Minnesota Board of Water and Soil Resources 2007; Appendix C). Approximately 98 percent of the wetlands within the approximately 6,720-acre study area were determined to have high overall quality due to minimal or no current disturbance, while disturbed wetlands accounted for less than 2 percent of all wetlands within the study area.

Functions and values of wetlands within the Additional Parcel were evaluated and rated by AECOM in August 2008 using the guidelines in the *Minnesota Routine Assessment Method for Evaluating Wetland Functions, Version 3.2* (MnRAM 3.2; Minnesota Board of Water and Soil Resources 2008; AECOM 2009). MnRAM considers numerous factors in determining the rating, or value, of a wetland. Sixty-three questions given in MnRAM 3.2 were addressed, and all factors were evaluated for each wetland surveyed. The Eggers and Reed (1997) classification system was used to classify wetland communities for the wetland function and value evaluation.

During the field surveys, data were collected related to the functions and values of 40 representative wetland locations within the Additional Parcel. Some survey locations were for individual wetlands, while several locations were surveyed for larger wetland complexes several locations were surveyed. An attempt was made to survey a variety of wetland types across the entire Additional Parcel.

#### 5.2.2 Private Lands

During field surveys in June 2009 and November 2010, data were collected on the functions and values of representative wetlands in the private lands (AECOM 2010, 2011). Wetland functions and values were rated using the guidelines in the *Minnesota Routine Assessment Method for Evaluating Wetland Functions, Version 3.2* (MnRAM 3.2; Minnesota Board of Water and Soil Resources 2008).

### 5.3 Lake Acreage and Shoreline Distance and Stream Frontage

Lakes and streams and their associated riparian habitat provide important habitat for fish and wildlife and recreational and other social functions and values for humans. Shoreline and stream frontage and associated habitat are not typically evaluated during a wetland assessment, and were not considered during ENSR and Barr wetland assessment studies. We determined the lineal distance of shoreline and stream frontage for the Forest Service and private land parcels using GIS and determined the length of frontage per acre of parcel as an index to the relative importance of frontage on the parcels.

### 5.4 Floodplain Acreage and Functions and Values

Floodplains are lowland areas adjacent to lakes, wetlands, and rivers that are covered by water during a flood. Floodplains carry and store water and help to attenuate water flows. Floodplains also provide important habitat for fish and wildlife, filter sediments, nutrients, and pollutants from the water, and are important for public uses, such as fishing and hunting.

Floodplain acreage on the Forest Service parcel was evaluated as part of ENSR, AECOM, and Barr wetland assessments of the Mine Site and Additional Parcel, and was based on the location of streams and adjacent topography and vegetation. Floodplain identification for the private lands was done using U.S. Department of Housing and Urban Development (HUD) Flood Hazard Boundary Maps for Cook County, Lake County, and St. Louis County (U.S. Department of Housing and Urban Development 2009). Floodplain importance was determined by measuring the number of acres of floodplain per acre of parcel as an index to the relative importance of floodplain on the parcels.



## 6.0 Wetland and Floodplain Assessment Results

### 6.1 Wetland Acreage Assessment

#### 6.1.1 U.S. Forest Service Lands

The Exchange Area includes approximately 6,518 acres. Approximately 4,069 acres (62 percent) of which have been identified as wetland (Appendices A and C; Barr 2007, AECOM 2009). The majority of wetlands are present in complexes located in the floodplain of Yelp Creek and the Partridge River or one of their tributaries. Wetland types (based on Eggers and Reed [1997] classification system) in the parcel, in decreasing order of total area, include coniferous bog (1,966 acres), coniferous swamp (1,228 acres), alder thicket or shrub-carr (467 acres), open bog (207 acres), and shallow marsh (100 acres; ENSR 2005, Barr 2006, AECOM 2009).

#### 6.1.2 Private Lands

The private lands parcels include approximately 7,075 acres. Approximately 4,671 acres have been identified as wetland (66 percent) based on information in NWI maps (Appendices B and D; USFWS 2008). Wetland types (based on Eggers and Reed [1997] classification system) in the parcel, in decreasing order of total area, include coniferous swamp (3,243 acres), alder thicket or shrub-carr (934 acres), shallow, open water (177 acres), open bog/palustrine emergent (86 acres), and shrub carr-deciduous (85 acres; AECOM 2010, 2011).

### 6.2 Wetland Functions and Values

#### 6.2.1 U.S. Forest Service Parcels

Approximately 98 percent of the wetlands within the approximately 6,518-acre Forest Service parcel were determined to have high overall quality based on minimal or no current disturbance, while disturbed wetlands accounted for less than 2 percent of all wetlands within the Forest Service parcel (Barr 2006, 2007).

AECOM (2009) determined wetland functions and values on approximately 3,898 acres in the Additional Parcel. Wetlands were rated high for nearly all wetland functions. Vegetation diversity/integrity was high for all wetlands because they have been little altered by recent human contact and had a relatively constant supply of water. Wetland vegetation needed no active management and provided quality habitat for fish and wildlife. The overall rating was based on the highest rated community for vegetation diversity and integrity, rather than the average or weighted value for community vegetation diversity and integrity. MnRAM 3.2 guidance states that this is the appropriate measure for assessing wetland quality for regulatory purposes (Minnesota Board of Water and Soil Resources 2008). Wetlands adjacent to Dunka Road were not rated, as Barr rated these wetlands during their 2007 wetland assessment (Barr 2007). In general, wetlands along Dunka Road were rated medium, primarily due to factors associated with wetland disturbance and visual characteristics.

Wildlife habitat was rated high for most wetlands on the basis of natural wildlife corridors and upland communities relatively untouched by recent human disturbances or impacts. Wildlife habitat was rated lower in areas where there were few plant communities.

Fish habitat was rated as not applicable for several wetlands, primarily because they did not have enough standing water throughout the year to support fish. Other characteristics associated with the rating include isolated wetlands that are not permanently flooded, or forested wetlands where the water table was below the surface for all or part of the year.

Amphibian habitat was rated high for most wetlands, primarily because they stayed inundated long enough in most years to allow amphibians to successfully breed. Amphibian habitat was rated not applicable for some wetlands if conditions needed to support amphibian breeding did not occur at the site. Forested wetlands with little or no standing water during the breeding season would likely not support amphibians.

Aesthetics, recreation, education, and cultural were rated medium. All wetlands were aesthetically pleasing, and could be used for recreation, education, and cultural purposes. However, road access to the Additional Parcel is only available via a private mining road and is not easily accessible to the general public. Alternate access would be overland by foot from Forest Service roads to the south and east. Thus, the general public is generally not able to enjoy these wetland values.

### 6.2.2 Private Lands

AECOM (2010, 2011) determined wetland functions and values on approximately 4,926 acres of the Hay Lake, 160 acres of the Hunting Club, 382 acres of the Lake, 31 acres of the McFarland, and 1,576 acres of the Wolf Land parcels during June 2009 and November 2010. AECOM evaluated wetland functions and values at 33 sites on the Hay Lake, 4 sites at the Hunting Club, 16 sites at the Lake, and 17 sites at the Wolf Land parcels. Based on an analysis of data, all wetlands on the sites were rated high for most wetland functions and values and wetlands on the private parcels share similar characteristics to those on the Mine Site and Additional Parcel.

## 6.3 Lake Acreage and Shoreline Distance and Stream Frontage

### 6.3.1 U.S. Forest Service Lands

Mud Lake, the dominant lake feature on Forest Service lands, is located within the One Hundred Mile Swamp. It is approximately 32 acres and has a shoreline of approximately 4,680 feet in length (Appendix E). The length of lake frontage per acre of federal land is 0.7 feet and serves as an index to the relative importance of lake frontage on the federal parcel.

Yelp Creek and the Partridge River flow out of One Hundred Mile Swamp and through portions of the Mine Site and Additional Parcel. Collectively, they are approximately 5.3 miles in length. Since both sides of the river provide riparian habitat, the length of the river on Forest Service lands was doubled to determine the importance of river frontage. The length of river frontage per acre of federal land is 8.5 feet and serves as an index to the relative importance of stream/creek frontage on the federal parcel.

### 6.3.2 Private Lands

Hay Lake, Little Rice Lake, and McFarland Lake are the dominant lake features on the private land parcels. Hay Lake is in the Hay Lake Parcel and is approximately 96 acres and has a shoreline of approximately 9,894 feet in length (Appendix F). Little Rice Lake is also in the Hay Lake Parcel and is approximately 29 acres and has a shoreline of approximately 4,829 feet in length. An unnamed lake between Hay Lake and Little Rice Lake is approximately 3.8 acres and has a shoreline of approximately 1,740 feet in length. The McFarland Parcel borders McFarland Lake. The parcel has a shoreline of approximately 506 feet in length along McFarland Lake. There are no lakes on the other private parcels. The combined length of lake frontage per acre for the parcels is 2.4 feet and serves as an index to the relative importance of lake frontage on the private land parcels.

The Pike River flows from the southern boundary to the northern boundary of the Hay Lake parcel and is approximately 8.2 miles in length. Riparian habitat was found on both sides of the river for 5.7 miles, and on only one side for 2.5 miles where the river formed the boundary of the parcel (e.g., we did not count river frontage for the eastern side of the river where it was along the boundary of the parcel).

Coyote Creek begins in Wolf Land 3, flows north into Wolf Land 4, and continues north of Wolf Land 4. The creek is approximately 0.18 miles in length in Wolf Land 3, and 1.02 miles in length in Wolf Land 4. Riparian habitat was found on both sides of the river.

The length of river frontage per acre is 12.2 feet and serves as an index to the relative importance of river frontage on the private land parcels.

## 6.4 Floodplain Acreage and Functions and Values

### 6.4.1 U.S. Forest Service Lands

Floodplain habitat associated with the Partridge River includes much of One Hundred Mile Swamp. Approximately 1,845 acres of floodplain are found on the Forest Service parcel. The number of acres of floodplain per acre of federal land is 0.3 and serves as an index to the relative importance of floodplain on the parcels.

### 6.4.2 Private Lands

Floodplain habitat is associated with the Pike River and Coyote Creek. Approximately 373 acres of floodplain are found on the Hay Lake parcel, 32.8 acres on Wolf Land 3 parcel, and 79.4 acres on the Wolf Land 4 parcel; no floodplains are associated with the Lake, McFarland, and Hunting Club parcels. The number of acres of floodplain per acre of parcel is 0.07 and serves as an index to the relative importance of floodplain on the parcels.





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## Appendix A. Summary of Wetland, Lake, Stream, and Floodplain Acreage, Length, and Frontage for Federal Parcel.

**Table A-1. Wetland Acreage by Wetland Type for Federal Lands.**

<b>Eggers and Reed Wetland Categories<sup>1</sup></b>	<b>Acres of Federal Lands<sup>2</sup></b>
Alder thicket	234.7
Alder thicket or Shrub-carr	232.6
Coniferous bog	1,966.3
Coniferous swamp	1,228.0
Deep marsh	1.3
Hardwood swamp	21.1
Lake	3.8
Open bog	206.6
Sedge meadow	22.4
Shallow marsh	99.5
Shallow, open water	0.1
Shrub-carr	37.7
Wet meadow	14.4
<b>Total</b>	<b>4,069</b>
<sup>1</sup> Eggers and Reed Wetland Community Types (1997).	

**Table A-2. Lake Name and Acreage and Lineal Distance of Lake Frontage.**

<b>Lake</b>	<b>Acreage</b>	<b>Lineal Distance of Lake Frontage (feet)</b>
Mud Lake	32	4,680

**Table A-3. River/Creek Name and Lineal Distance of River/Creek Frontage.**

<b>Stream/Creek</b>	<b>Length in Miles</b>	<b>Lineal Distance of Lake Frontage (feet)</b>
Yelp Creek/Partridge River	5.3	55,397
<sup>1</sup> Calculated as length in miles x 5,280 feet x 2 (both sides of river/creek counted as frontage feet).		

**Table A-4. Acreage of Mapped Floodplain.**

<b>Floodplain</b>	<b>Acreage</b>
Floodplain associated with Yelp Creek and Partridge River	1,845



## Appendix B. Summary of Wetland, Lake, Stream, and Floodplain Acreage, Length, and Frontage for Nonfederal Parcels.

**Table B-1. Wetland Acreage by Wetland Type for Nonfederal Lands.**

<b>Eggers and Reed Wetland Categories<sup>1</sup></b>	<b>Acres of Nonfederal Lands<sup>3</sup></b>
Alder thicket or Shrub-carr	933.8
Coniferous swamp	3243.4
Hardwood swamp	1.6
Hardwood/coniferous swamp	56.4
Open bog	4.9
Open bog/palustrine emergent	86.2
Open water	6.0
Shallow marsh	33.3
Shallow, open water	176.6
Shrub - deciduous/coniferous	43.9
Shrub carr - deciduous	84.6
<b>Total</b>	<b>4,671</b>
<sup>1</sup> Eggers and Reed Wetland Community Types (1997).	

**Table B-2. Lake Name and Acreage and Lineal Distance of Lake Frontage.**

<b>Lake</b>	<b>Acreage</b>	<b>Lineal Distance of Lake Frontage (feet)</b>
<b>Hay Lake Parcel</b>		
Hay Lake	96	9,894
Little Rice Lake	29	4,829
Unnamed Lake	3.8	1,740
<b>McFarland Parcel</b>		
McFarland Lake	NA	506

**Table B-3. River/Creek Name and Lineal Distance of River/Creek Frontage.**

Stream/Creek	Length in Miles	Lineal Distance of Lake Frontage (feet) <sup>1</sup>
Pike River	8.2	73,392
Coyote Creek	1.2	12,672

<sup>1</sup> Calculated as length in miles x 5,280 feet x 2 for portions of the river that are entirely within the boundary of the Hay Lake parcel (5.7 miles) and only on one side where the river is along the boundary of the parcel (2.5 miles).

<sup>2</sup> Coyote Creek is entirely within the boundaries of Wolf Land 3 and Wolf Land 4. Calculated as length in miles x 5,280 feet x 2

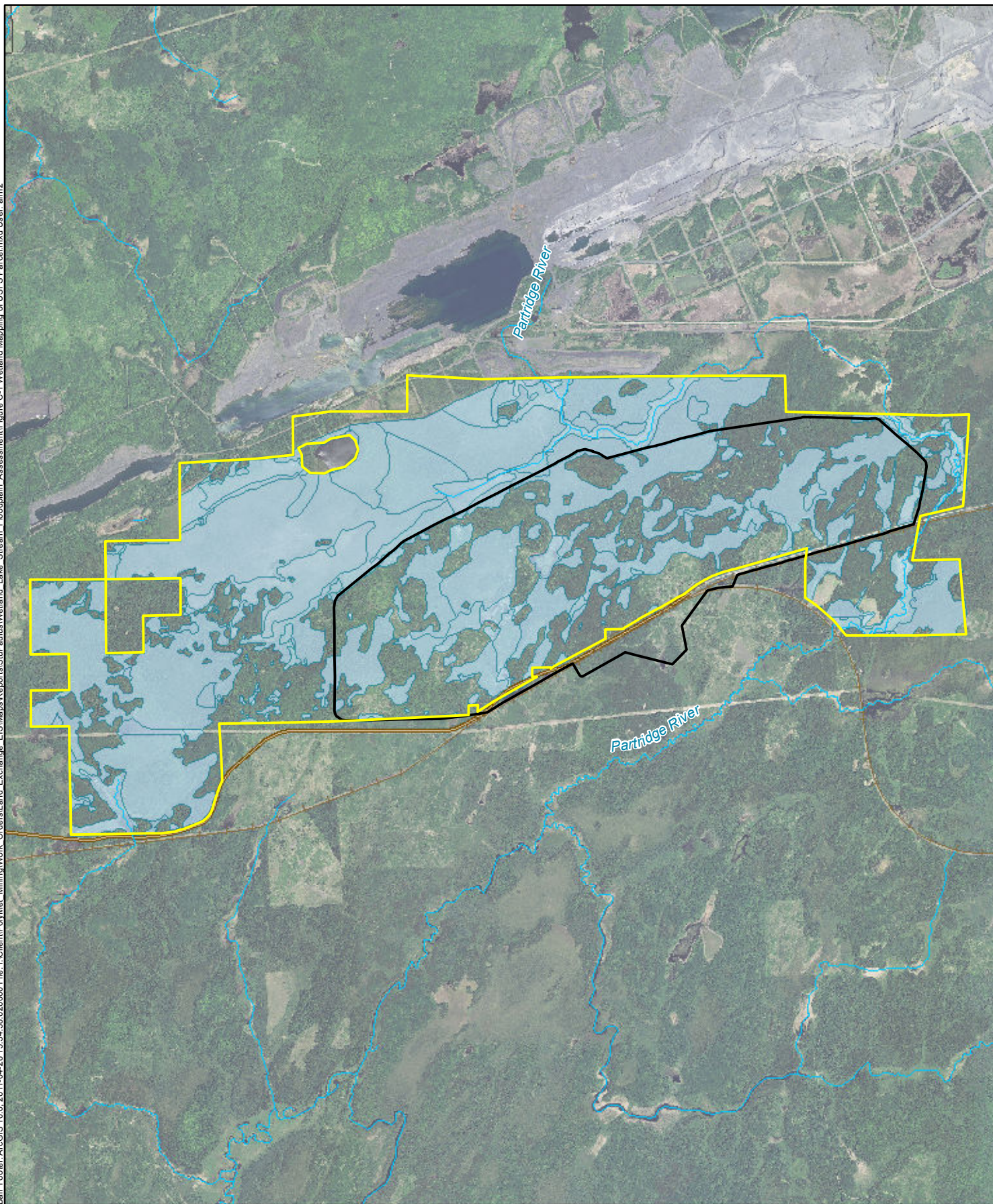
**Table B-4. Acreage of Mapped Floodplain.**



Floodplain	Acreage
Floodplain associated with the Pike River	372.5
Floodplain associated with Coyote Creek	112.2

**Appendix C. Wetland Mapping of the Federal Parcel (St. Louis County) Proposed for Exchange.**







 USFS Parcel  
 Mine Site

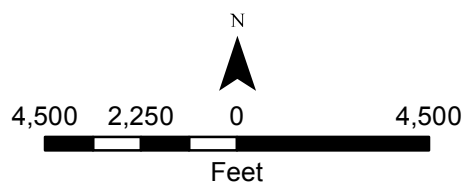


Figure C-1  
WETLAND MAPPING  
OF THE USFS PARCEL  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota

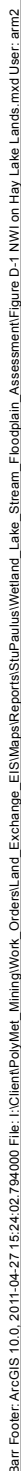




**Appendix D. National Wetland Inventory Mapping of the Nonfederal Parcels (Cook, Lake, and St. Louis Counties) Proposed for Exchange.**







 Hay Lake lands  
 Wetlands (NWI)  
 Rivers & Streams

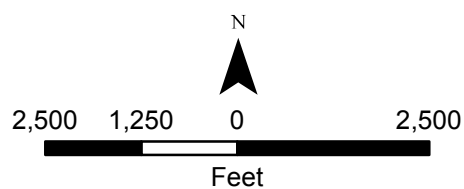
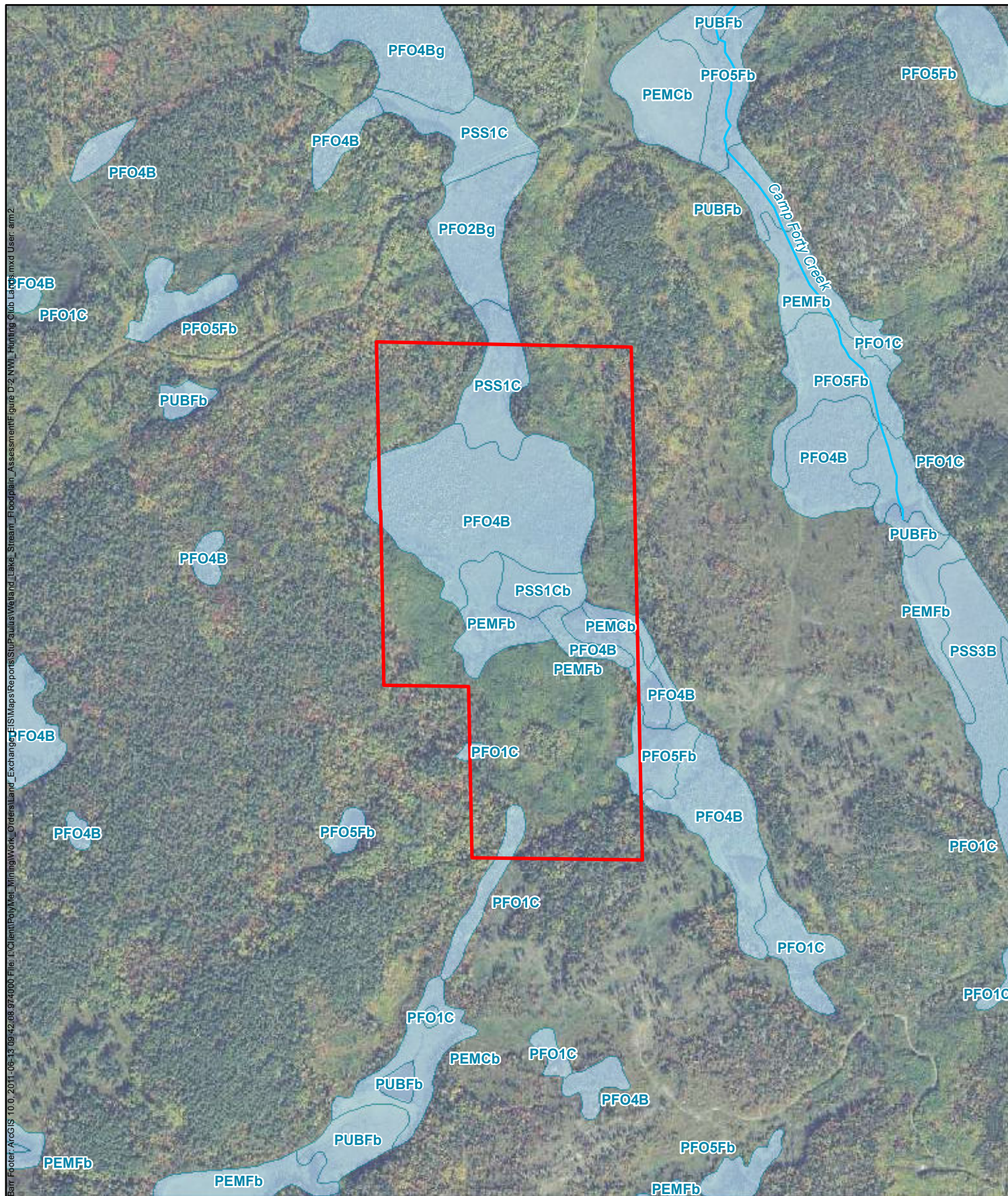


Figure D-1  
NATIONAL WETLANDS INVENTORY  
HAY LAKE LANDS  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota





- Hunting Club lands
- Wetlands (NWI)
- ~ Rivers and Streams

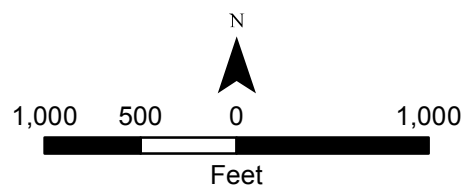


Figure D-2  
NATIONAL WETLANDS INVENTORY  
HUNTING CLUB LANDS  
Saint Louis County, MN



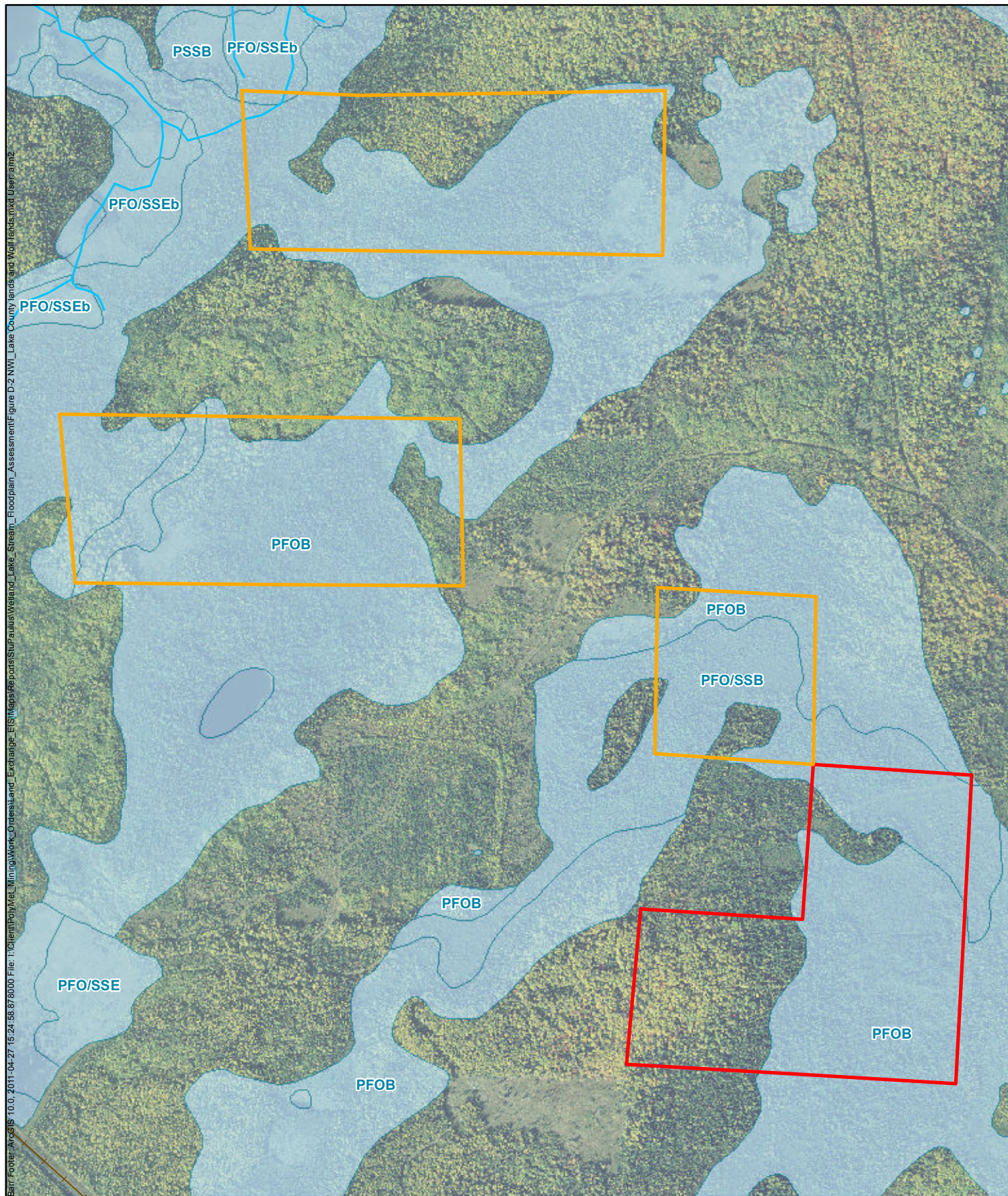


Figure D-3  
NATIONAL WETLANDS INVENTORY  
LAKE COUNTY LANDS NORTH  
AND WOLF LANDS 1  
Lake County, MN





- Lake County lands
- Wetlands (NWI)
- ~ Rivers and Streams

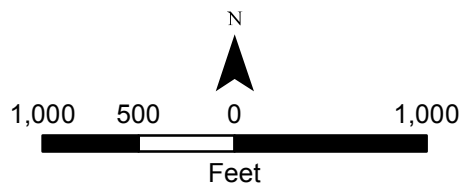
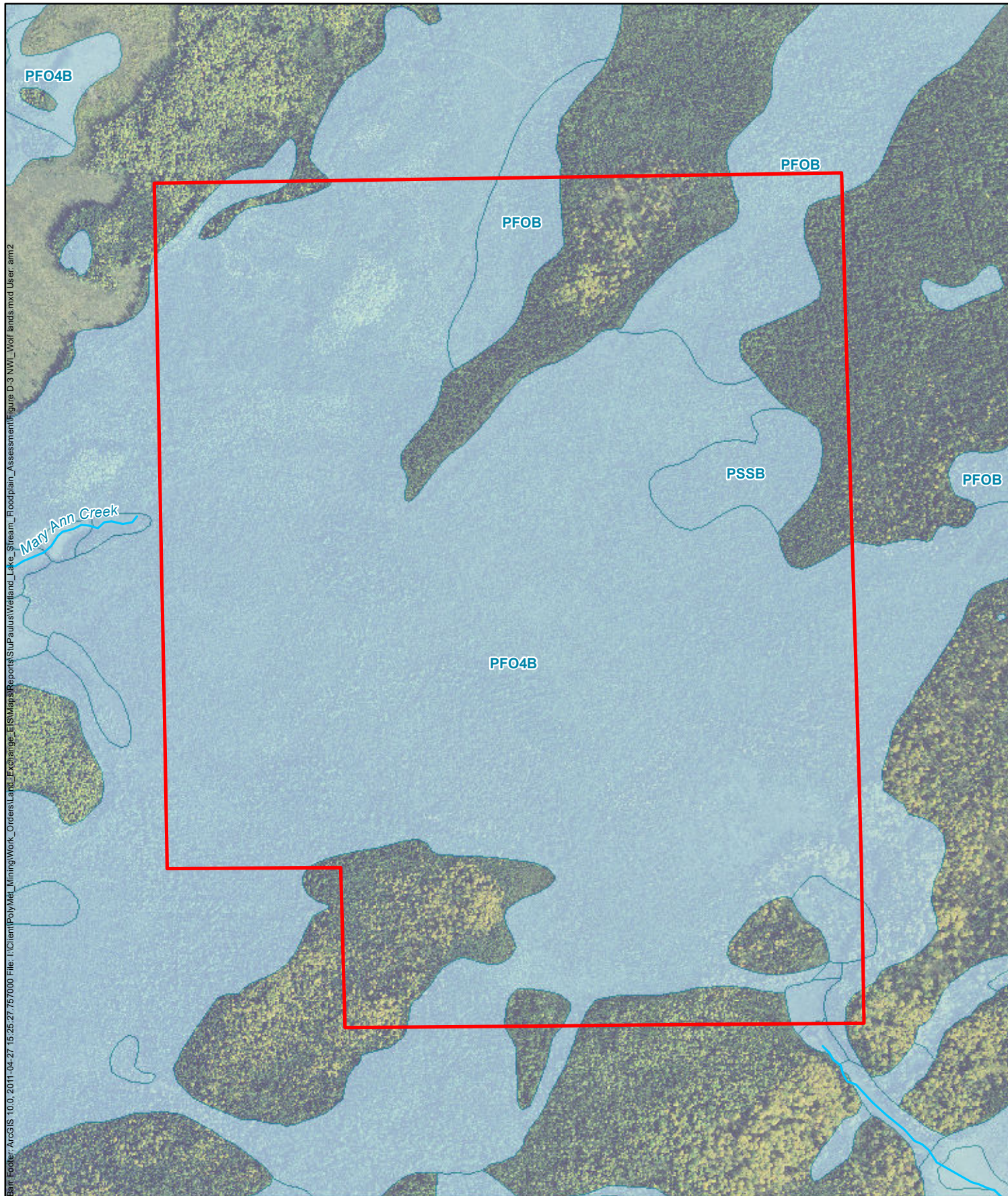


Figure D-4  
NATIONAL WETLANDS INVENTORY  
LAKE COUNTY LANDS SOUTH  
Lake County, MN





- Wolf lands
- Wetlands (NWI)
- ~ Rivers and Streams

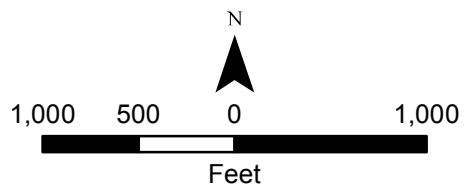
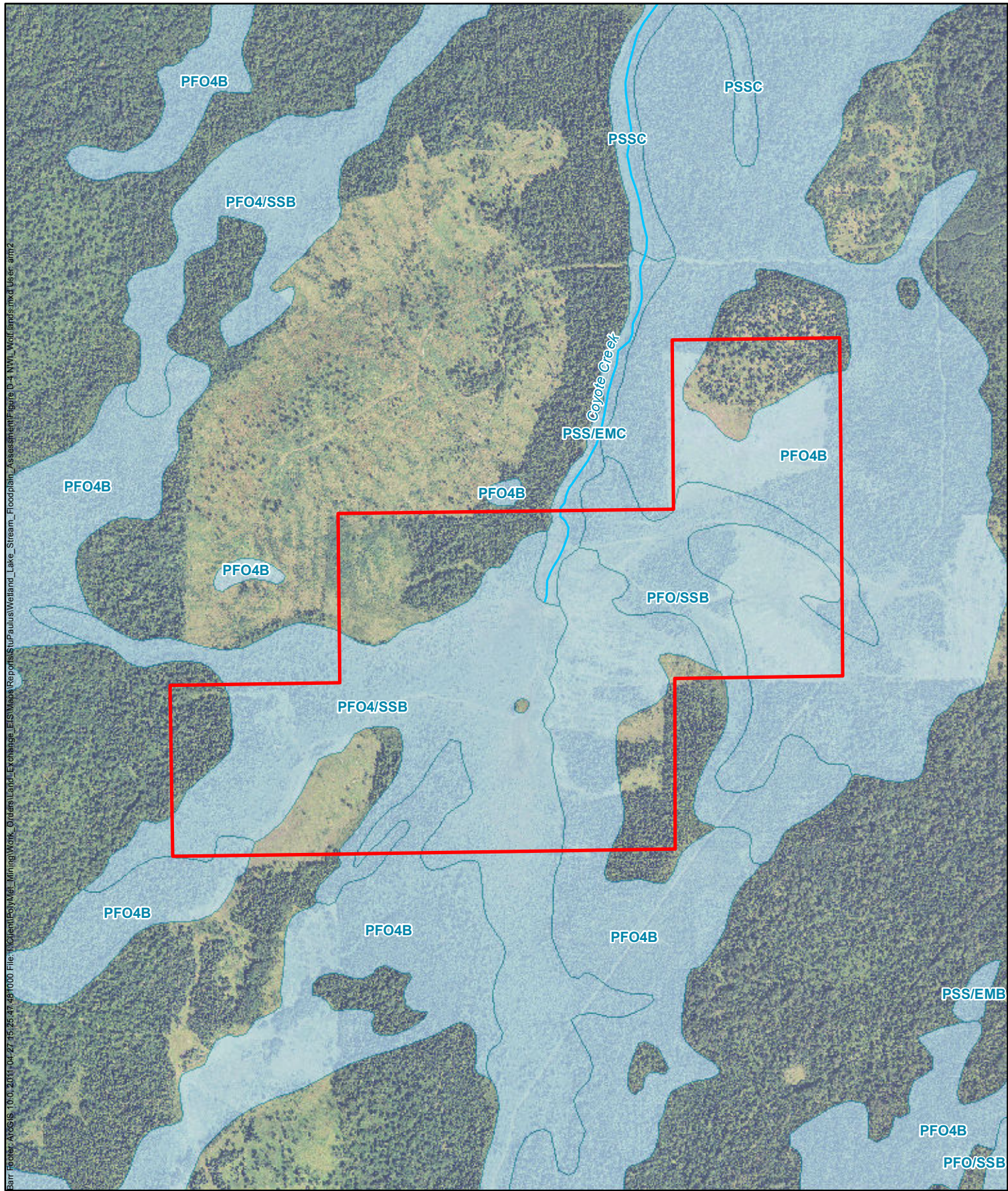


Figure D-5  
NATIONAL WETLANDS INVENTORY  
WOLF LANDS 2  
Lake County, MN





- Wolf lands
- Wetlands (NWI)
- ~ Rivers and Streams

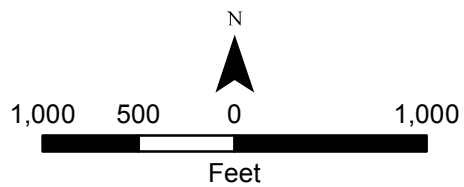
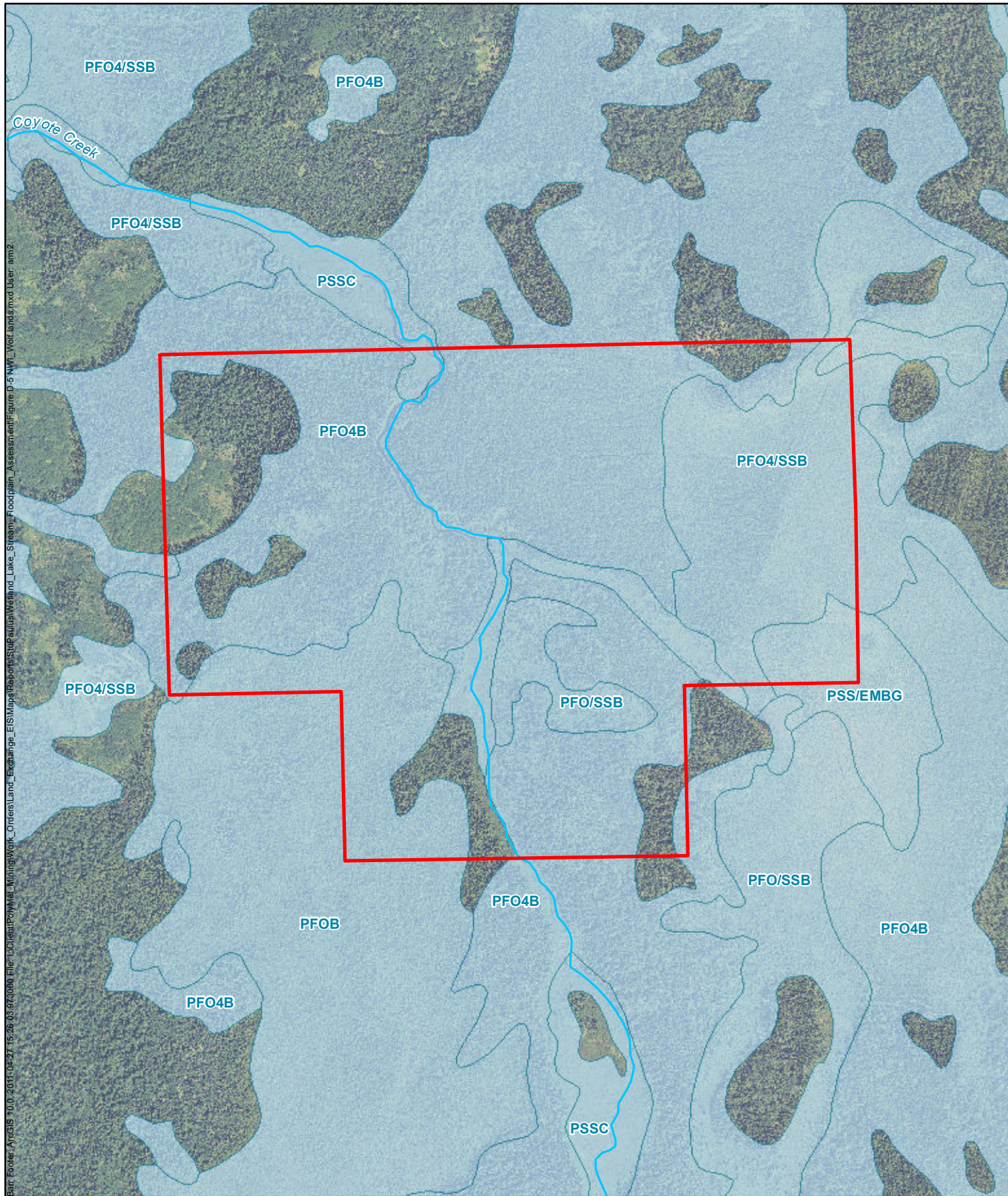


Figure D-6  
NATIONAL WETLANDS INVENTORY  
WOLF LANDS 3  
Lake County, MN





- Wolf lands
- Wetlands (NWI)
- ~ Rivers and Streams

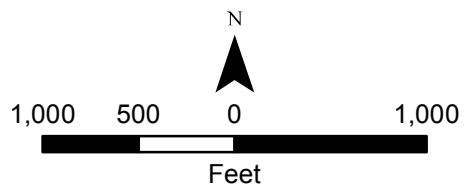


Figure D-7  
NATIONAL WETLANDS INVENTORY  
WOLF LANDS 4  
Lake County, MN

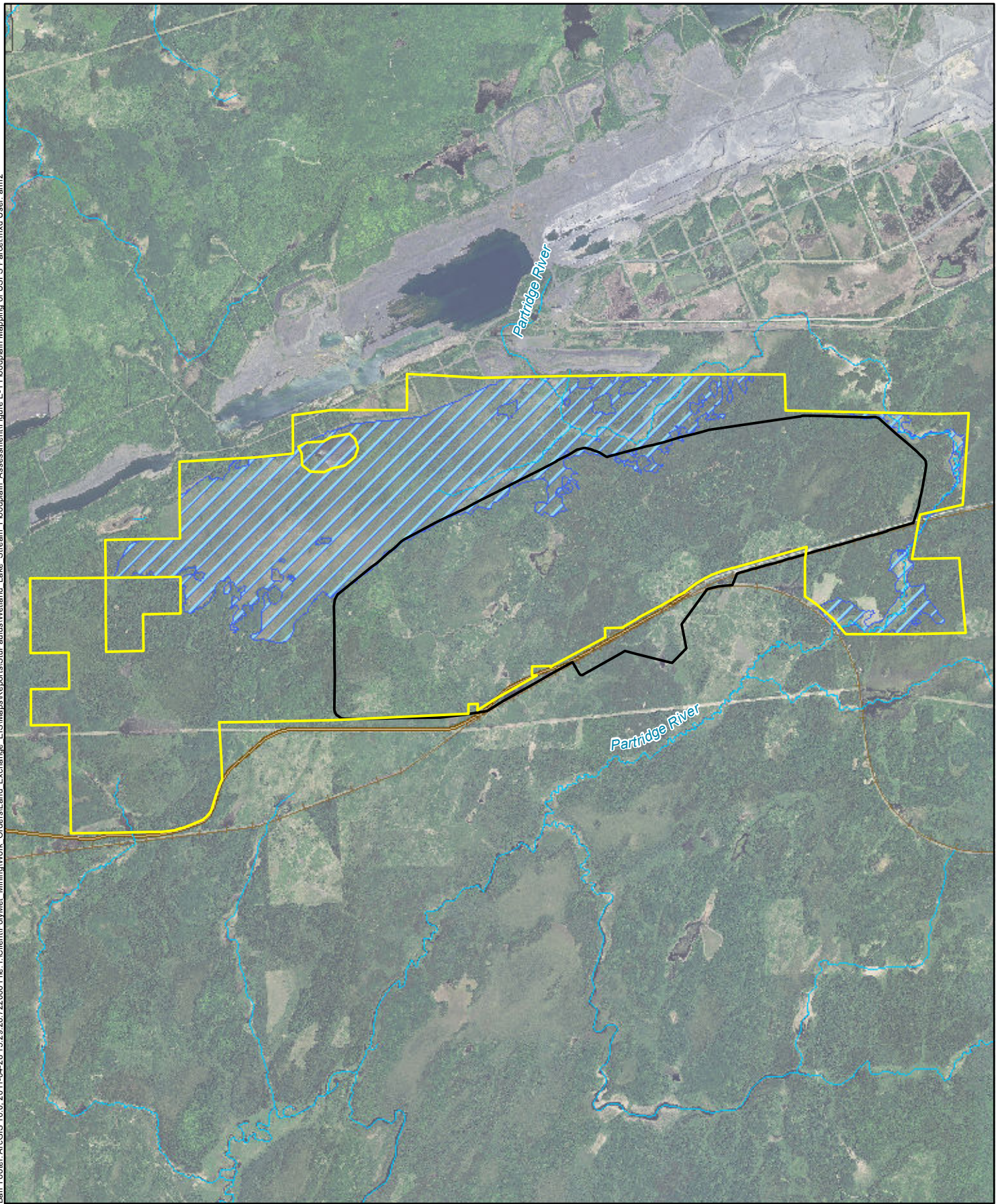




**Appendix E. Floodplain Mapping of the Federal Parcel (St. Louis County) Proposed for Exchange.**







-  USFS Parcel
-  Mine Site
-  500-Year Floodplain

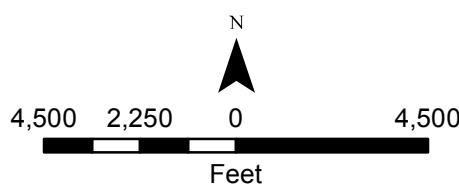


Figure E-1  
FLOODPLAIN MAPPING  
OF THE USFS PARCEL  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota



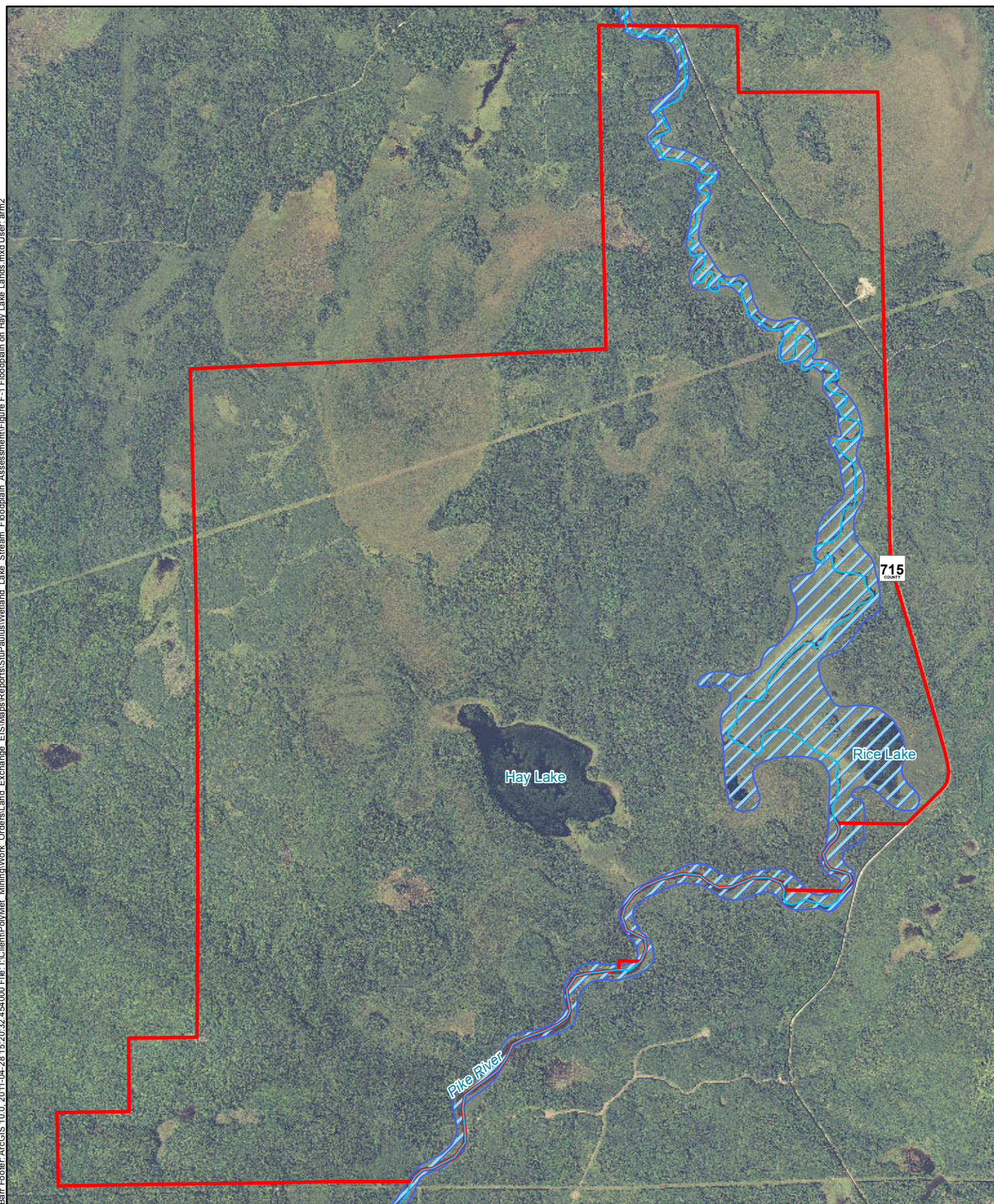






**Appendix F. Floodplain Mapping of the Nonfederal Parcels (St. Louis and Cook Counties) Proposed for Exchange.**







-  Hay Lake lands
-  100-Year Floodplain (FEMA)

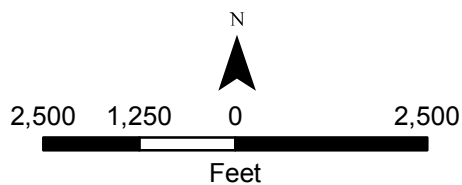
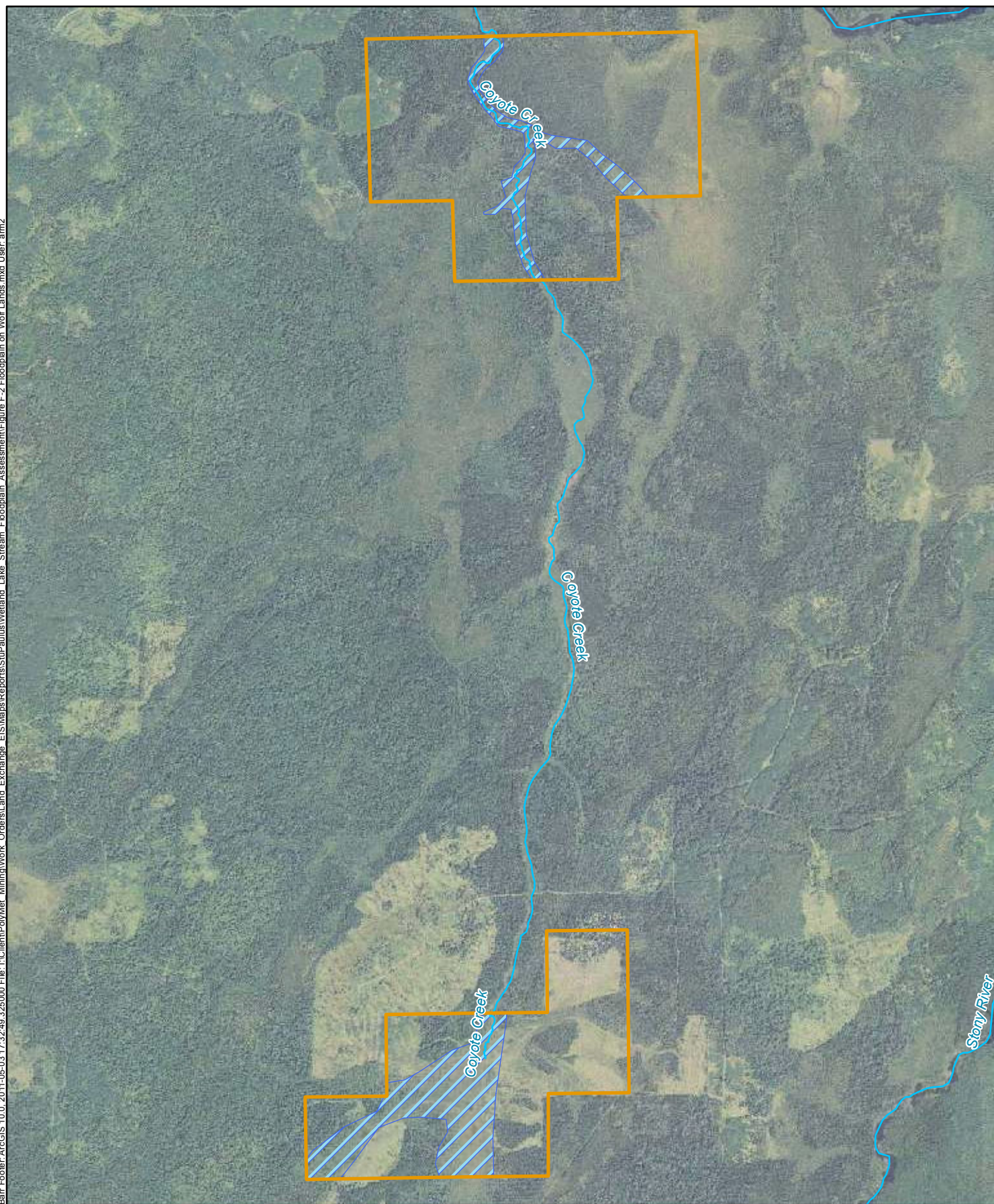




Figure F-1  
FLOODPLAIN ON  
HAY LAKE LANDS  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota





-  Wolf lands
-  Approximate Floodplain

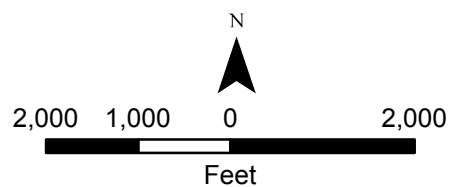


Figure F-2  
FLOODPLAIN ON  
WOLF LANDS  
PolyMet Mining, Inc.  
Hoyt Lakes, Minnesota