NorthMet Project Cultural Landscape Study

FINAL REPORT

Prepared by

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Bois Forte Band of Chippewa Indians
Grand Portage Band of Lake Superior Chippewa
Fond du Lac Band of Lake Superior Chippewa
Bad River Band of Lake Superior Chippewa Indians

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Landscape Research LLC

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Barr Engineering

for

PolyMet Mining Inc.
Hoyt Lakes, Minnesota

September 15, 2012

POLYMET
MINING

September 18, 2012

Mr. Tom Hingsberger
Regulatory Branch
United States Army Corps of Engineers, St. Paul District
180 5th Street East, Suite 700
St. Paul, MN 55101-1678

Dear Tom,

PolyMet Mining Inc. (PolyMet) is submitting the attached report titled "NorthMet Project Cultural Landscape Study." This report was prepared by the Bois Forte Band of Chippewa Indians, Grand Portage Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, Bad River Band of Lake Superior Chippewa Indians, Barr Engineering Company (Barr) and Landscape Research LLC (Landscape Research).

In 2010, the St. Paul District, United States Army Corps of Engineers (ACOE) required PolyMet to implement a plan for the identification of historic properties of traditional spiritual and cultural significance to Bois Forte Band of Minnesota Chippewa, the Fond du Lac Band of Lake Superior Chippewa, and the Grand Portage Band of Lake Superior Chippewa (the Consulting Bands). This plan was developed by the Consulting Bands and ACOE through numerous consultation meetings as part of the Section 106 review to comply with the National Historic Preservation Act (NHPA; 16 USC 470) for the NorthMet Project (Project) in St. Louis County, Minnesota. The Project's area includes territory ceded by the Lake Superior Chippewa Bands under the 1854 Treaty of LaPointe. Thus, the Bad River Band also participated in later portions of the field work.

PolyMet hired Landscape Research as a qualified historian to provide baseline ethno-historical research pertaining to Ojibwe use of the Area of Potential Effects (APE), identify cultural features and natural landscape features, conduct interviews with Consulting Band members as appropriate, and produce the attached final study report that contained this information, and information from other sources as appropriate. Barr, as PolyMet's consultant, aided in conducting plant surveys as part of the joint field work conducted by the Consulting Bands, ACOE and the United States Forest Service (USFS) for this study, and assisted in some interviews with Band members. PolyMet also hired botanist Deb Pomroy to conduct field level work as part of the associated plant studies. Archaeological field work leading to the NRHP eligibility assessments made in this study was conducted by the ACOE, with assistance from the USFS.

If you have comments or questions please contact me at 218-471-2162 or by email at kpylka@polymetmining.com.

Sincerely,

Kevin Pylka
Manager of Environmental Permitting and Compliance

Enc.: NorthMet Project Cultural Landscape Study - September 2012

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NorthMet Project Cultural Landscape Study

FINAL REPORT

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September 15, 2012

MANAGEMENT SUMMARY

In 2010, the St. Paul District, United States Army Corps of Engineers (Corps) required PolyMet Mining Inc. (PolyMet) to implement a plan for the identification of historic properties of traditional spiritual and cultural significance to Bois Forte Band of Minnesota Chippewa, the Fond du Lac Band of Lake Superior Chippewa, and the Grand Portage Band of Lake Superior Chippewa (Consulting Bands). This plan was developed by the Consulting Bands and Corps through numerous consultation meetings as part of the Section 106 review for the NorthMet Project (Project) in St. Louis County, Minnesota (Maps 1-2, Appendix Section 6.12).

PolyMet hired Landscape Research LLC (Landscape Research) and the Barr Engineering Company (Barr) to complete portions of this study, which is primarily a cultural landscape study. The proposed Project to be developed by PolyMet Mining Inc. includes excavation of a polymetallic disseminated magmatic sulfide deposit and processing of the ore at the former LTV Steel Mining Company (LTVSMC) site, which is located about 8 miles west of the deposit and about 5 miles north of the city of Hoyt Lakes in St. Louis County, Minnesota (Map 3, Appendix). The facilities of the former Erie Mining Company taconite processing plant (later LTVSMC) will be used for processing the ore. A hydrometallurgical process will be used to extract copper, nickel, palladium, platinum, cobalt and gold from the ore**.** Project plans call for the excavation of up to 32,000 tons of ore per day, using open-pit mining methods after overburden and waste rock stripping and stockpiling. At the Mine Site, the Project area is approximately 7400 acres of which 3,016 acres are estimated to have ground-level Project impacts including approximately 527 acres for mine pits and 795 acres for waste rock stockpiles. At the Plant Site, the area controlled by PolyMet is approximately 15,000 acres of which approximately one-third is estimated to be utilized by the Project on previously disturbed lands including approximately 3,000 acres for a flotation tailings basin. Most of this area that would be utilized has already been impacted by LTVSMC operations.

The Project Area is within the territory ceded by the Lake Superior Chippewa Bands under the 1854 Treaty of LaPointe. These bands retain their inherent rights to hunt, fish and gather within this territory.

The Project is anticipated to impact greater than three acres of jurisdicational wetlands and therefore requires a Department of the Army Permit from the Corps for authorization to discharge dredged, or fill, material into jurisdictional wetlands under Section 404 of the Clean Water Act. As a major federal action, the Corps was required to complete an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA 1969). The Corps must also comply with Section 106 of the National Historic Preservation Act (NHPA; 16 USC 470).

Section 106 of NHPA requires federal agencies to take into account the effects of their actions on historic properties and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment. Consultation among agency officials, tribal nations, and other parties with an interest in the effects of the undertaking on historic properties is intended to accommodate historic preservation concerns with the needs of federal undertakings. Consultation is intended to identify historic properties potentially affected by the undertaking, assess effects, and seek ways to avoid, minimize, or mitigate adverse effects. Potential effects on historic resources eligible for the National Register of Historic Places (NRHP) must be evaluated.

The Consulting Bands have emphasized the importance of natural resources to their people, stating that the resources play an integral role in their society and culture including spiritual practices. The Consulting Bands and the Corps worked together to develop a plan for the

identification of NRHP-eligible historic properties of spiritual and cultural significance within the NorthMet Project Area of Potential Effect (APE); also referred to as "Preliminary Project APE." Consideration of impacts to features associated with cultural practices and spiritual beliefs that do not qualify for the NRHP are addressed in light of federal tribal trust responsibilities and treaty rights within the 1854 Ceded Territory.

Four cultural landscape study components provided information to understand the Ojibwe landscape and identify significant properties potentially eligible for the NRHP. Interviews with Ojibwe Band elders and Band members; development of cultural landscape historic contexts; completion of plant surveys; and reconnaissance-level archaeological fieldwork to identify potential cultural resources provided the basis for identification and evaluation.

The project team included Rose Berens, Bois Forte Tribal Historic Preservation Officer (THPO); Bill Latady, Bois Forte Deputy THPO; Leroy DeFoe, Fond du Lac THPO; Rick Guitar, Fond du Lac wetland specialist; Grand Portage THPO Vicki Raske, and Robert Swanson and MaryAnn Gagnon from the Grand Portage Museum. Consultants hired by PolyMet were Landscape Research historian Carole Zellie; Barr scientists, Daniel Jones, Cheryl Feigum, Rachel Walker and Mark Jacobsen, and consulting botanist Deb Pomeroy. Corps archaeologist Bradley Johnson and Lake Superior National Forest archaeologist Lee Johnson were also team members. The Bands, Carole Zellie, and Rachel Walker conducted Band elder interviews and Band members participated in plant surveys and archaeological fieldwork. Edith Leoso, Bad River Band THPO, joined the team in June 2012.

The Corps developed the "Preliminary Area of Potential Effect (APE)" for the identification of historic properties of significance to the Consulting Bands (Map 1, Appendix)**.** Encompassing all or part of eleven townships centered on the former LTVSMC plant and tailings basin, the APE is generally bounded by the Embarrass River at the north and west and by the Partridge River at the south and east, extending down the St. Louis River to Lake Superior. The APE was based primarily on the potential for effects to ground and surface waters. Other types of potential effects, such as audible or visual effects or direct ground disturbance, would occur in a much more limited area.

The Corps in consultation with the Consulting Bands proposed two initial survey areas. Map 1 shows the "Corps Proposed Areas of Initial Plant Surveys Located within the Area of Potential Effect." As noted by the Corps, "based on current modeling, groundwater effects are not predicted to occur beyond the Initial Study [Survey] Areas" (Corps 2010:1). Initial Survey Area One and Initial Survey Area Two, hereinafter referred to as Survey Area One and Survey Area Two, were thus defined within the APE (Maps 1-2, Appendix) and were the focus of background research and fieldwork.

Information provided by Ojibwe elders and band members during interviews, and plant surveys, historic context development and archaeological fieldwork conducted in 2010-2012 resulted in identification of five properties potentially eligible for the NRHP. Historic contexts for food, sacred and medicinal plants, wild rice, maple sugar, and trails, promontories, outcrops and place names assisted in conducting the survey and identification. All plant survey and archaeological fieldwork data was mapped and overlaid for comparison with historic maps wherever possible (see Maps 1-21, Appendix).

The properties are the Spring Mine Lake Sugarbush in Section 11 of T59N, R14W (SL-HLC-017); a granite-capped promonotory in Section 3 of T59N, R14W and the adjacent viewshed of the *Missabe Widjiw* (SL-HLC- 015; -016); the intersection of two Indian trails in Section 3 of

T59N, R14W (SL-HLC- 018), and a trail corridor crossing Sections 1, 2, and 12 of T59N, R14W and Section 35 of T60N R13W (SL-HLC- 019; Map 21, Appendix; Sections 4.0 and 6.10).

Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, and Bulletin 16b, *How to Complete the National Register Multiple Property Documentation Form* provide information for evaluating the NRHP eligibility of related properties. The Multiple Property Listing (MLR) may be used to nominate and register thematically-related historic properties simultaneously or to establish the registration requirements for properties that may be nominated in the future. The MLR title, "Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing" incorporates evaluation of the previously noted *Missabe Widjiw* and the granite-capped promonotory and overlook, sugarbush, trail intersection and trail corridor.

Although various NRHP and NPS regulatory guidelines refer to "properties of *religious* and cultural significance," the Consulting Bands prefer the term *spiritual* [and cultural] significance. In this report, the term spiritual is used except where quoted directly from guidelines or other references.

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List of Acronyms and Abbeviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect(s)
Barr	Barr Engineering Company
BIF	Biwabik Iron-Formation
BP	Before Present
Cliffs Erie	Cliffs Erie LLC
Corps	St. Paul District, U.S. Army Corps of Engineers
CFR	Code of Federal Regulations
CR	County Road
CWA	Clean Water Act
EIS	Environmental Impact Statement
ECS	Ecological Classification System
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
GLO	General Land Office
GPS	Global Positioning System
LTVSMC	LTV Steel Mining Company
MNDNR	Minnesota Department of Natural Resources
MHS	Minnesota Historical Society
MNSHPO	Minnesota State Historic Preservation Office
MPCA	Minnesota Pollution Control Agency
MPDF	Multiple Property Documentation Form
MPL	Multiple Property Listing
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
NPC	Native Plant Community
NPS	National Park Service
NRHP	National Register of Historic Places
PolyMet	PolyMet Mining Inc.
RGGS	RGGS Land and Minerals LTD
TEK	Traditional Ecological Knowledge
TEKW	Traditional Ecological Knowledge and Wisdom
SHPO	State Historic Preservation Office
THPO	Tribal Historic Preservation Office
USDA-NRCS	United States Department of Agriculture- Natural Resource Conservation Service
USFS	United States Forest Service
USGS	United States Geological Survey

1.0 INTRODUCTION AND OBJECTIVES

In 2010 PolyMet Mining Inc. hired Landscape Research LLC (Landscape Research) and the Barr Engineering Company (Barr) to conduct a Cultural Landscape Study as part of cultural resource evaluations for the Project in St. Louis County, Minnesota (Maps 1-2; *maps 1-21 are located in Appendix 6.12*). The Project Area includes territory ceded by the Lake Superior Chippewa Bands (the Bands) under the 1854 Treaty of LaPointe. Bands retain rights to hunt, fish and gather. The project requires completion of an Environmental Impact Statement (EIS) and a United States Army Corps of Engineers (Corps) CWA Section 404 wetland permit. The project must comply with Section 106 of the National Historic Preservation Act (NHPA; 16 USC 470) and its implementing regulations (36 CFR 800), and the National Environmental Protection Act (NEPA 1969).

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Consultation among agency officials, tribal nations, and other parties with an interest in the effects of the undertaking on historic properties is intended to accommodate historic preservation concerns with the needs of federal undertakings. Consultation is intended to identify historic properties potentially affected by the undertaking, assess effects, and seek ways to avoid, minimize, or mitigate adverse effects. Potential effects on historic resources eligible for the National Register of Historic Places (NRHP) must be evaluated. The assessment of potential effects on historic or potentially eligible properties, and ways to avoid, minimize or mitigate those effects are not within the scope of this document.

The Corps is consulting with four federally recognized Indian Tribes that have expressed an interest in consultation: the Bois Forte Band of Minnesota Chippewa, the Fond du Lac Band of Lake Superior Chippewa, the Grand Portage Band of Lake Superior Chippewa, and the Bad River Band of Lake Superior Chippewa.

The Consulting Bands have emphasized the importance of natural resources to their people, stating that the resources play an integral role in their society and culture including religious practices. Natural resources cannot be separated from cultural resources. As required by the Corps, the objective of this study is the identification of NRHP-eligible historic properties of spiritual and cultural significance within the Survey Areas. To be considered under NHPA, a cultural resource must qualify as a historic property. (See historic property definition and discussion of NRHP Criteria for Evaluation, Section 1.3.3.)

This cultural landscape study was thus designed to fulfill requirements of NHPA and NEPA, as well as help satisfy federal tribal trust responsibilities and consider any potential impingement of usufructory rights under the 1854 Treaty of La Pointe. Consideration of impacts to features associated with cultural practices and spiritual beliefs that do not qualify for the NRHP—such as plant and animal species—are addressed in light of federal tribal trust responsibilities and treaty rights within the 1854 Ceded Territory.

1.1 Cultural Landscape Study Components

Four study components provide information to understand the Ojibwe landscape and identify potentially NRHP-eligible properties. These components are detailed in Section 2.4:

1. Interviews with Ojibwe Band elders and Band members;
2. Archival research to develop cultural landscape historic contexts;
3. Completion of plant surveys;

4. Completion of reconnaissance-level archaeological fieldwork to identify potential cultural resources.

The project team included Rose Berens, Bois Forte Tribal Historic Preservation Officer (THPO); Bill Latady, Bois Forte Deputy THPO; Leroy DeFoe, Fond du Lac THPO; Rick Guitar, Fond du Lac wetland specialist; Grand Portage THPO Vicki Raske; and Robert Swanson and MaryAnn Gagnon from the Grand Portage Museum. Consultants hired by PolyMet were Landscape Research LLC historian Carole Zellie; Barr scientists, Daniel Jones, Cheryl Feigum, Rachel Walker and Mark Jacobsen and consulting botanist Deb Pomeroy. Corps archaeologist Bradley Johnson and Lake Superior National Forest archaeologist Lee Johnson were also team members. The Bands, Carole Zellie, and Rachel Walker conducted Band elder interviews and Band members participated in plant surveys and archaeological fieldwork. Edith Leoso, Bad River Band THPO, joined the team in June 2012.

1.2 Area of Potential Effect (APE) and Survey Areas One and Two Boundaries

The Corps developed the APE for the identification of historic properties of traditional cultural and spiritual significance to the Consulting Bands (Map 1). Encompassing all or part of eleven townships centered on the former LTVSMC plant and tailings basin, the APE is generally bounded by the Embarrass River at the north and west and by the Partridge River at the south and east, extending down the St. Louis River to Lake Superior. It includes approximately 68 sections extending from a portion of the eastern tier of sections in T60N, R15W at the west to a portion the western tier of sections in T60N, R12W at the east. The Corps proposed this APE, based on partial watersheds, because it reflected an initial assessment of the potential for effects to ground and surface waters (Corps 2010:1). Other types of potential effects, such as audible or visual effects or direct ground disturbance would occur in a much more limited area. The APE is defined by the ACHP:

> . . . the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking . . . . (36 CFR § 800.16[d]).

Because of the size of the APE, the Corps and the Consulting Bands agreed to focus on two survey areas. Map 1 shows the "Corps Proposed Areas of Initial Plant Surveys Located within the Area of Potential Effect." As noted by the Corps, "based on current modeling, groundwater effects are not predicted to occur beyond the Initial Study [Survey] Areas" (Corps 2010:1). Survey Area One and Survey Area Two were thus defined within the APE (Maps 1-2; Figure 1).

The boundary as shown on Map 1 defines a historically important area within the Embarrass and Partridge River watersheds. The APE provides an appropriate baseon which to establish broad historic contexts for research on Pre-Contact Period and Contact-Period topics. The historic contexts assist in interpreting the plant surveys focused on Survey Areas One and Two, as well as the much broader geographic area described by Ojibwe Band elders.

1.2.1 NorthMet Project Area Description

The proposed Project to be developed by PolyMet Mining Inc. includes excavation of a polymetallic disseminated magmatic sulfide deposit and processing of the ore at the former LTV Steel Mining Company (LTVSMC) site, which is located about 8 miles west of the deposit and about 5 miles north of the city of Hoyt Lakes in St. Louis County, Minnesota (Map 3). The facilities of the former Erie Mining Company taconite processing plant (later LTVSMC) will be used for processing the ore. A hydrometallurgical process will be used to extract copper, nickel, palladium, platinum, cobalt and gold from the ore**.**

Project plans call for the excavation of up to 32,000 tons of ore per day from three mine pits totaling 527 acres, using open-pit mining methods after overburden and waste rock stripping and stockpiling (in three stockpiles totaling 795 acres). The total area encompassed by the Project at the Mine Site is approximately 7,400 acres of which 3,016 are estimated to be directly impacted by the Project. The approximately 15,000-acre Plant Site includes the Process Plant, tailings basin, Shop Areas and buffer land. An estimated 5,000 acres at the Plant Site are anticipated to be directly impacted by the Project. Ore would be transported from the Mine Site to the Process Plant on a track segment of the Erie Mining Company Railroad (1957). A refurbished and modified Process Plant built by the Erie Mining Company in 1957 and expanded in 1967–68, is proposed to process the ore. Flotation tailings and hydrometallurgical residue from ore processing would be disposed of on top of and adjacent to the existing 3,000-acre taconite tailings basin respectively. The idled processing plant and existing tailings basin were owned and operated by LTVSMC prior to being purchased by Cliffs Erie. Mining operations, including stripping and stockpiling, drilling, blasting, loading, hauling, and processing of the ore, are expected to be conducted 24 hours per day, 365 days per year, over the 20-year life of the project. Proposed new buildings will be constructed for flotation, concentrate storage and loading and hydrometallurgical processing.

The majority of the surface land ownership at the Mine Site is held by the United States Forest Service (USFS), with smaller portions owned by PolyMet, Cliffs Erie (a wholly owned subsidiary of Cliffs Natural Resources Inc.) and the State of Minnesota. U.S. Steel originally held the majority of the mineral rights at the Mine Site. In 1989, mineral rights to 4,162 acres covering the deposit and adjacent areas were leased to PolyMet (previously Fleck Resources). Subsequently, U.S. Steel sold the mineral and mining rights to RGGS Inc. (RGGS), but RGGS maintained PolyMet's exclusive lease on the minerals. There are currently three 40-acre areas within the Mine Site in which the mineral rights are owned by Longyear Mesaba Company, but are under lease to PolyMet. A land exchange whereby the USFS land at the Mine Site is exchanged for private lands adjacent to the Superior National Forest within the 1854 Treaty area is proposed.

The proposed land exchange between the United States of America, acting through the USFS, U.S. Department of Agriculture (Superior National Forest) and PolyMet is an assembled land exchange. The exchange is proposed under the authority of the Weeks Act of March 1, 1911, as amended; General Exchange Act of March 20, 1922; Federal Land Exchange Facilitation Act of 1988; and the Federal Land, Policy and Management Act of October 21, 1976 (PolyMet 2011). The federal land encompasses approximately 6,650 acres and is located in the west/central portion of the Superior National Forest on the Laurentian Ranger District. Privately owned properties to the north and west of the federal land have been extensively impacted over the years by open-pit mines, mine waste rock stockpiles, tailings basins, mine processing facilities, railroad grades, and general mining activities.

As shown on Map 3, there are six areas of proposed activity:

1. The 2,813-acre processing facility ("the plant area" and the "Erie Mining Company Concentration Plant") is located in parts of Sections 3, 4, 5, 8, 9, 10, and 16, T59N, R14W. The plant buildings are outside of Survey Area Two, south of the Tailings Basin.

2. The 3,000-acre tailings basin is located in parts of sections 3, 4, 5, 8, 9, 10, and 16, T59N, R14W, and parts of Sections 32, 33, and 34, T60N, R14W. The tailing basins are located in Survey Area Two.

4. The 2,801-acre lease area is located in Sections 1, 2, 3, 4, 9, 10, 11, and 12, T59N, R13W. The lease area is located in Survey Area One.

5. The two proposed railroad spurs are located in parts of Sections 10, 16, 17, and 18, T59N, R13W and parts of Sections 9, 13, 14, 15, 16, 23, and 24, T59N, R14W. Those in 10, 16, and 17 of T59 R13W are in Survey Area One.

6. The 6,518-acre USFS land exchange area is in Survey Area One and includes the 2,801-acre lease area. The additional area outside of the lease area is located in Section 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 17, and 18, T59N, R13W and Sections 33, 34, 35, and 36, T60N, R13W.

1.3 Regulatory Background for Evaluation of Historic Properties of Spiritual and Cultural Significance to Indian Tribes

As amended in 1992, NHPA is the basis for tribal consultation in the Section 106 review process. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties and provide the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on those undertakings. Section 101(d)(6)(A) clarifies that properties of religious and cultural significance to Indian tribes may be eligible for listing in the NRHP. Section 101(d)(6)(B) requires that federal agencies, in carrying out their Section 106 responsibilities, consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by an undertaking (ACHP 2008:1,19). In addition to archaeological sites, these properties include spiritual sites, sugar camps, and natural resources including wild rice and medicinal plants. As noted by the ACHP, it is through consultation with Indian tribes themselves that such properties can be properly identified and evaluated (ACHP 2008:19).

Through the Treaty of 1854 the Lake Superior Chippewa ceded ownership of lands in northeastern Minnesota to the United States. This includes the Bois Forte, Grand Portage, and Fond du Lac Bands. The Lake Superior Chippewa retain their inherent right to hunt, fish, and gather within the 1854 Ceded Territory. The ability to exercise these rights may be impacted by the proposed Project because of potential effects to resources in the Ceded Territory. As discussed in Section 1.4, a number of Phase I and Phase II archaeological studies have been conducted in this area, but no study of the broader landscape has been conducted to identify properties of spiritual and cultural significance to the tribes.

The Bois Forte and Grand Portage reservation lands are not located within the APE. However, the Fond du Lac Reservation is on the St. Louis River and within the APE. No Band members reside within Survey Areas One and Two. These areas and the APE, however, are known to and visited by Band members. As the ancestral homeland of the Anishinaabeg and other indigenous peoples, the ACHP notes, "tribal consultation for projects off tribal lands is required because the NHPA does not restrict tribal consultation to tribal lands alone and those off tribal lands may be the ancestral homelands of an Indian tribe or tribes, and thus may contain historic properties of

religious and cultural significance to them" (ACHP 2008:17-18). More specifically,

> Historic properties of religious and cultural significance to an Indian tribe may be located on ancestral (also referred to as aboriginal) homelands, or on officially ceded lands (lands that were ceded to the U.S. government by the tribe via treaty). In many cases, because of migration or forced removal, Indian tribes may now be located far away from historic properties that still hold such significance for them. Accordingly, the regulations require that agencies make a *reasonable and good-faith effort* to identify Indian tribes that may attach religious and cultural significance to historic properties that may be affected by the undertaking, even if tribes now are located a great distance away from such properties and undertakings (ACHP 2008:7).

For a cultural resource to be afforded consideration under the NHPA it must qualify as a historic property. Consideration of natural resource impacts, or impacts to cultural resources that do not qualify for the NRHP, are evaluated in light of federal tribal trust responsibilities and treaty rights within the 1854 Ceded Territory.

It should be noted that although various NRHP and NPS regulatory guidelines refer to "properties of *religious* and cultural significance," the Consulting Bands prefer the term *spiritual* and cultural significance. In this report, this term is used except where quoted directly from guidelines or other references.

1.3.1 Traditional Cultural Properties

NRHP evaluation criterion for Traditional Cultural Properties (TCPs) is sometimes included in the discussion of properties associated with Indian tribes. Guidance for evaluation of TCPs is contained in the National Park Service (NPS) Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King rev. 1998). This bulletin defines tangible properties that are eligible for inclusion in the NRHP because of

> (a) association with cultural practices or beliefs of a living community that are rooted in that community's history, and
> (b) importance in maintaining the continuing cultural identity of the community.

The ACHP notes, however:

> For a TCP to be found eligible for the National Register, it must meet the existing National Register criteria for eligibility as a building, site, structure, object, or district. TCPs are defined only in NPS guidance and are not referenced in any statute or regulation, and **refer to places of importance to any community, not just to Indian tribes.** Therefore, this terminology may be used when an agency is considering whether <u>any</u> property is eligible for the National Register (ACHP 2008:19).

1.3.2 Historic Properties of Spiritual and Cultural Significance to Indian Tribes

Although there are similarities with TCPs, the ACHP notes that within the Section 106 process, the appropriate terminology for sites of importance to Indian tribes is **"historic property of religious and cultural significance to an Indian tribe**" (ACHP 2008:19). This phrase appears in NHPA and Section 106 regulations and applies strictly to tribal sites (ACHP 2008:19).
The ACHP also notes:

> Section 101(d)(6)(A) of the NHPA reminds agencies that historic properties of traditional spiritual and cultural importance to Indian tribes may be eligible for the National Register. Thus, it is not necessary to use the term TCP when considering whether a site with significance to a tribe is eligible for the National Register as part of the Section 106 process. The NPS Bulletin 38 guidelines are helpful, however, in providing an overview of how National Register criteria are applied. Under the NHPA and the Section 106 regulations, the determination of a historic property's religious and cultural significance to Indian tribes is not tied to continual or physical use of the property (ACHP 2008:19).

In July 2012 the ACHP issued the Question and Answer publication, "Native American Traditional Cultural Landscapes and the Section 106 Process." It notes that the term "traditional cultural landscape" has not been formally defined by the NPS and is currently under study; future publications will provide guidance on identification of traditional cultural landscapes as part of the Section 106 process (ACHP 2012).

Figure 1. Looking west at a portion of Survey Area One in Section 12, T59N, R13W, 10/13/2010. Barr photo.

36 CFR Part 800 defines a historic property:

> . . . any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian

tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR § 800.16 (l)(1).

1.3.3 NRHP Evaluation Criteria

At the present time Bulletin 38 is the best source of guidance on inventory and evaluation of properties of spiritual and cultural significance to Indian tribes. Following analysis of information from Band elder interviews, historic context development, plant surveys, and reconnaissance-level fieldwork, inventoried properties received preliminary evaluation for NRHP eligibility. (See Sections 4.0 and Appendix 6.10.) According to 36 CFR Part 60.4, buildings, structures, and sites; groups of buildings, structures or sites forming historic districts, landscapes, and individual objects are included in the Register if they are more than 50 years old and meet the criteria specified in the NRHP Criteria for Evaluation (NPS 2004). For a cultural resource to be included in or considered eligible for inclusion in the NRHP, it must be a tangible property such as a district, site, building, structure, or object, that is greater than 50 years old, retains its historic integrity, and meets one or more of the criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history (36 CFR § 60.4).

Evaluation of the significance of the identified resources is based on multiple lines of documentation, including information from oral tradition and interviews, the applicable historic context(s) and assessment of historic integrity for each resource. The historic integrity of a cultural landscape relates to the ability of the landscape to convey its significance.

Depending on the resource—potentially including diverse features such as an overlook or vista, a granite outcrop, food and medicinal plants and trail segments or corridors—various types of historic contexts and analyses are required to determine if a landscape retains the characteristics, physical attributes, and historical and cultural associations that it had during its period of significance.

1.4 Previous Cultural Resource Studies

A number of cultural resource studies have been conducted within and adjacent to the APE. Most were prepared for mining and energy projects. In 2008 the USFS compiled the *Heritage Resources Report* summarizing previous archaeological investigations in the land exchange area in Survey Area One (Forest Service 2008):

Foth and Van Dyke *(*1999) *Supplemental Site Specific Resource Information: PolyMet Mining Corporation NorthMet 1999 Exploration Project.*

Ketz, K. A. and J. A. Kloss [106 Group Ltd.](2004). *Cultural Resources Assessment for the Environmental Impact Statement Scoping Document PolyMet Mining Corporation NorthMet Project.*

Caine, Christy A. H. and Grant E. Goltz [Soils Consulting](2006). *Phase I Archaeological Survey. Northmet Mine Impact Area. Polymet Mining. St. Louis County, Minnesota.*

Caine, Christy A.H. and Grant E. Goltz [Soils Consulting](2007). *Phase I Archaeological Survey of Dunka Road Expansion and Substation and Phase II Archaeological Evaluation of NorthMet Archaeological Site.*

Each study provided a preliminary analysis of certain architectural and archaeological resources. The *Phase I Archaeological Survey NorthMet Mine Impact Area PolyMet Mining* (Soils Consulting 2006) focused on the lease area in sections 1-4 and 9-11 of T59N, R13W. The survey identified a pre-Contact Native American site identified as the "NorthMet Site" in Section 2, T59N, R13W. This site was "characterized by lithic materials" at a short-term campsite (Soils Consulting 2007:11). As detailed in the *Phase I Archaeological Survey Dunka Road Expansion and Substation and Phase II Archaeological Evaluation of NorthMet Archaeological Site,* it was subsequently determined that the "NorthMet Site" was ineligible for inclusion in the NRHP (Soils Consulting 2007:11). The Knott Logging Camp, a previously recorded site, was identified to the north of the project boundary. Sites recorded with Minnesota State Historic Preservation Office (MNSHPO) archaeological inventory numbers are shown on Table 3.

A number of other studies have been conducted within and adjacent to the APE. In 2007, Landscape Research LLC evaluated historic resources at the former Erie Mining Company plant area constructed in 1954-1957. This area includes the former Erie Mining Company plant where the crushing, concentrating, and pelletizing processes were used to produce taconite pellets, and the adjacent tailings basin (Map 4). The *Phase I Evaluation and Historic Context Study for PolyMet Mining Corporation NorthMet Project* (Zellie 2008a) focused on architectural history resources. The APE for architectural history was limited to the area in which the proposed project might cause direct or indirect impacts to NRHP-eligible resources. The Concentrator Building (SL-HLC-008) was recommended eligible for listing in the NRHP. An Erie Mining Railroad segment (SL-HLC-015) was evaluated and recommended eligible as part of the plant complex, including proposed rail spur additions to the existing line in Sections 13, 14, 23, and 24 of T59N, R14W. Properties recorded with MNSHPO inventory numbers are shown on Tables 1 and 2. The lease area was not evaluated because there were no impacted resources associated with the plant's period of significance for architectural history, 1957-1967.

Additional studies conducted within the APE that provided information for historic context development for the present study include the *Mesaba Energy East Range Corridors Preliminary Cultural Resources Report* (106 Group 2005); *Cultural Resources Assessment and Phase I Survey for the Mesaba Energy Project–East Range (Hoyt Lakes) Site* (106 Group Ltd 2005); *Mesaba Energy East Range Corridors Resources Preliminary Report* (106 Group Ltd 2005a); *Phase I Cultural Resources Evaluation for the Mesabi Nugget Project* (Zellie 2009). Properties recorded with MNSHPO inventory numbers are shown on Tables 1, 2, and 3.

1.4.1 Predictive Models

Several archaeological studies within or adjacent to the APE explained their utilization of the Minnesota Historical Society (MHS) predictive model for the distribution of archaeological sites. This model is useful to the current project because it is based on reconstruction of the environmental setting in which Native peoples lived. Such models allow archaeologists to look at landforms and resources present today and "ask how a Pre-Contact population would distribute themselves according to the extraction and use of these resources" (106 Group 2005:9). Hydrology is the most important determinant of archaeological site location, and prehistoric sites are most likely to be found on lands adjacent to wetlands and rivers (Anfinson 1990).

The *Mesaba Energy East Range Corridors Preliminary Cultural Resources Report* (106 Group 2005) included a cultural resources assessment for portions of T58N, R14W; T58N, R15W; T58N, R16W; T59N, R14W; T59N, R15W; and T59N, R16W. (The project area also involved portions of T56N, R16-19W and T57N, R17-19W). The study proposed a sensitivity model and testing strategy for archaeological resources including a general set of criteria to determine archaeological sensitivity (106 Group 2005:17):

1. within 500 feet of an existing or former water source of 40 acres or greater in extent or within 500 feet of a former or existing perennial stream;
2. located on topographically prominent landscape features;
3. located within 300 feet of a previously reported site;
4. located within 300 feet of a former existing historic structure or feature.

Because of the lack of 40-acre lakes, and a prevalence of smaller bodies of water, the study modified the criteria, noting, "in many parts of Minnesota, groupings of smaller lakes and ponds with associated wetlands cover the landscape. In many cases very little of a project area is within 150 m (50 ft.) of a lake that is the established 40 acres or greater. Within complexes of small lakes, ponds, and wetlands, topographically prominent areas, such as ridges and knolls, rise above these water-body areas providing excellent views for hunting" (106 Group 2005:17). Revised sensitivity criteria were developed (106 Group 2005:17-18):

1. within 500 feet (150 m) of an existing or former water source (lake, pond, river, stream);
2. elevated, comparatively well-drained areas within or immediately adjacent to, a marsh or wetland of 10 acres or greater in extent;
3. topographically prominent areas that command a wide view of the surrounding landscape;
4. adjacent to a known or suspected portage or transportation route;
5. located within 300 feet of a previously reported site, and/or
6. located within 300 feet of a former or existing historic structure or feature (such as a building foundation or cellar depression).

Such criteria can be refined for various types of Pre-Contact and Contact Period sites (Sections 3.2.5 and 3.2.6). A grouping of site types and geographic areas in which to expect Pre-Contact and Contact period archaeological sites within St. Louis County was also developed (106 Group 2005:18):

1. Base camps near any lake, especially an inlet or outlet (related mounds may be found on elevated topography near a base camp);
2. Temporary campsites near any body of water;

3. Subsistence resource procurement may vary depending on resource location (i.e. taconite deposits contain high quality flaking materials such as chert and jasper);
4. Hydraulic intersection points: river/stream, lake/stream, marsh/stream;
5. Predominantly on lakeshores, to a lesser extent on rivers (village sites); and
6. Lake inlets and outlets (with streams) where wild rice grew.

The *Phase I Archaeological Survey NorthMet Mine Impact Area PolyMet Mining* (Soils Consulting 2006) utilized the first set of criteria in a sampling model to define areas of moderate and high archaeological potential for the Mine Site. The recommendation for Sections 1-4 and 9-11 of T59N, R13W was that "potential for the presence of pre-contact cultural resource sites appears to be rather low. No significant streams pass through the area and surface water bodies consist only of a few small ponds and beaver flowages. Much of the area consists of wetlands and upland areas are irregular and of low relief " (Soils Consulting 2006:5). This study suggests that a beginning date for habitable surface conditions within the project area would be after approximately 10,000 B.P. After the formation of the present course of the Partridge River, however, the area would have "offered little more than diffuse resources such as dispersed hunting and resource gathering. Such activities rarely leave traces that could be detected with most cultural resource survey methods"(Soils Consulting 2006:5-6). The study concluded that the most likely cultural resource properties appear to be "occupation sites from the early pre-contact period associated with former water bodies and drainways, and transient use sites associated with the more recent trails" (Soils Consulting 2006:6). The study sampled locations associated with trails shown on the Trygg Map (Trygg 1966:17) and focused on:

1. visible linear landscape features that would have provided easier landmarks to follow;
2. logical crossing points of wetlands and, in particular, the Partridge River.

Two sample areas near a trail corridor shown by Trygg were selected. One is an upland terrace overlooking the narrowest crossing point of the Partridge River, and the other is a narrow esker-like ridge that terminates at a narrow crossing point of a large wetland (Soils Consulting 2006:6-7). All shovel tests were negative for cultural materials (Soils Consulting 2006:9-14). Included in the survey sample was an area to test a "possible section" of one of the Indian trails identified on the Trygg map:

> It was located along a narrow north-south trending esker-like ridge with the southern terminus at a narrow in a large swamp. A prominent feature along this ridge was what appeared to be remnants of a deeply worn trail, much more pronounced than a normal game trail. In addition to testing this possible trail segment and stopping place, this sample area also tested what was likely the shoreline of a former medium-sized lake (Soils Consulting 2006:13).

All shovel tests, however, proved negative (Soils Consulting 2006:13).

1.4.2 Application to the Cultural Landscape Study

See Section 3.0 for discussion of the application of aspects of the predictive model to fieldwork planning.

1.5 Previously Inventoried Properties

Exiting inventory data for Survey Areas One and Two and the broader APE was obtained from the MNSHPO. No NRHP-eligible properties have been previously identified within Survey Areas One or Two (Maps 4, 5).

Table 1 shows ten properties within or adjacent to the APE previously determined eligible or listed in the NRHP. Segments of the Height of Land Portage (SL-EMB-160, SL-WHT-002, SL-PIK-039) appear to be the only NRHP property that would be considered to directly contribute to research on historic properties of traditional spiritual and cultural significance to Indian tribes. These segments are at the western boundary of the APE. Other properties are mining and transportation-related, except the Pyhala, Mattson, and Nelimark properties in Waasa Township (T60N, R14W) and Embarrass Township (T60N, R15W). These properties are associated with Finnish agricultural settlement north of the Embarrass River and north of the APE boundary (Koop 1988). Table 2 shows 23 inventoried properties within the APE previously determined not NRHP-eligible. Table 3 shows 30 archaeological sites previously recorded within the APE. As discussed in Section 1.4, most appear to be related to the late 19th- and early 20th-century logging industry.

A number of potentially significant cultural sites of various types are labeled on the "Composite Map of United States Land Surveyor's Original Plats and Field Notes" prepared by J. W. Trygg (1966:17; Map 9). Labeled sites such as the "Remains of Indian Encampment" in Section 34, T60N, R14W, however, have not had any archaeological investigation and do not appear in the MNSHPO database (Figure 2; Map 9).

Figure 2. Looking northeast at the south end of the area identified as the "Remains of Indian Encampment" by Trygg (1966:17), in Section 32, T60N, R14W, 10/13/2010. Barr photo.

Table 1. Properties Listed on or Determined Eligible for the NRHP Within or Adjacent to APE Source: MNSHPO

MNSHPO Inventory	Property Name	Location	NRHP status	Within APE (Y/N)
SL-EMB-160 SL-WHT-002 SL-PIK-039	Height of Land Portage/Embarrass River	T59N, R15W; 16W (multiple)	Listed 1991	N (west boundary)
SL-EMB-002-10	Pyhala Farm	Embarrass Township	Listed 2003	N
SL-EMB-076-84	Matson Farmstead	Embarrass Township	Listed 1990	N
SL-EMB-014	Nelimark Sauna	Embarrass Township	Listed 1990	N
SL-HLC-001	E. J. Longyear First Diamond Drill Site	Sec 33 T59N, R14W	Listed 1977	N
SL-HLC-008	Erie Mining Co. Concentrator Building	Sec 8, 17 T59N, R14W	Rec'd eligible (Zellie 2008a)	Y
SL-HLC-015	Erie Mining Company Mine and Plant Track segment	Secs 8-9; 15-18 T59N, R14W	Rec'd eligible (Zellie 2008a)	Y
SL-HLC-024	DM&IR Railway Stephens Spur	Secs 25-26; 36 T59N, R15W	Rec'd eligible (Zellie 2009)	Y
SL-HLC-025	DM&IR Railway Main Line	Sec 6, T58N, R14W	Rec'd eligible (Zellie 2009)	Y
SL-HLC-026	Mesabi Trail / County Highway 26 Segment	Secs 25, 26, T58N, R15W	Rec'd eligible (Zellie 2009)	Y

Table 2. Previously Inventoried Properties Within or Adjacent to APE Determined Not NRHP Eligible (see Map 4). Source: MNSHPO

MNSHPO Inventory	Property Name	Location	Date	NRHP status	Within APE (Y/N)
SL-HLC-pending	Erie Mining Co. Mine Pit No. 2	Secs 14-15 T59, R14W	1957	Rec'd further evaluation (Ketz 2004)	Y
SL-HLC-pending	Duluth, Missabe & Iron Range Railway	Sec 33, T59, R14W	1884	Rec'd further evaluation (Vermeer 2005)	Y
SL-HLC-002	Erie Mining Co. Coarse Crusher	Sec 9, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-003	Erie Mining Co. Fine Crusher	Sec 16, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-004	Erie Mining Co. Conveyor and Drive House	Sec 9, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-005	Erie Mining Co. General Shops	Sec 16, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y

MNSHPO Inventory	Property Name	Location	Date	NRHP status	Within APE (Y/N)
SL-HLC-006	Erie Mining Co. Reservoir	Sec 9, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-007	Erie Mining Co. Water Tower	Sec 9, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-009	Erie Mining Co. Thickening Tanks	Sec 17, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-010	Erie Mining Co. Pelletizing Building (razed)	Sec 17, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-011	Erie Mining Co. Central Heating Plant	Sec 17, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-012	Erie Mining Co. Fuel Oil Tanks	Sec 16, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-013	Erie Mining Co. Pellet Stockpile and Stacker	Sec 17, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-014	Erie Mining Co. Mine Area No. 2 Shops	Sec 15, T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-015	Erie Mining Co. Railway Mine and Plant Track	Parts of Secs 8-9,15-16, 18 T59N, R14W	1957	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-016	Erie Mining Co. Tailings Basin	Parts of Secs 3- 5, 8-10, 16 T59N, R14W, parts of Secs 32- 34, T60N,R14W	1957-	Rec'd NotEligible (Zellie 2008b)	Y
SL-HLC-017	Erie Mining Co. Mine Area No. 1 Shops	Sec 18, T59N, R14W	1957	Rec'd Eligible (Zellie 2008b)	Y
SL-HLC-018	Erie Mining Co. Concentration Plant Complex	Parts of Secs 7- 9 ;16-17, T59N, R14W	1957-	Rec'd Not Eligible (Zellie 2008b)	Y
SL-HLC-019	Erie Mining Co. Mine Area No. 1	Parts of Sec 19, T59N, R15W; parts of Secs 21-24; 28 T59N, R14W	1957-	Rec'd Not Eligible (Zellie 2009)	Y
SL-HLC-020	Minnesota State Highway 35 Segment	Sec 27 T59N, R15W	ca. 1916	Rec'd Not Eligible (Zellie 2009)	Y
SL-HLC-021	Haul Road Bridge over Highway 35	Sec 27 T59N, R15W	ca. 1962	Rec'd Not Eligible (Zellie 2009)	Y
SL-HLC-022	DM&IR Railway Knox Spur	Secs 25- 26 T59, R15W Sec 30, T59, R14	ca. 1957	Rec'd Not Eligible (Zellie 2009)	Y
SL-HLC-023	Erie Mining Co. Mine Track-Mine Area 1	Secs 18-19 T59N, R14W	1957-	Rec'd Not Eligible (Zellie 2009)	Y

Table 3. Archaeological Site Locations inventoried within APE
Source: MNSHPO (See Map 5)

MNSHPO Site Number	Site Name	T	R	Sec	Located Within		
					APE	Survey Area One	Survey Area Two
21SL0920	Sturgeon Lake Beach	60	12	20	**N**		
	Sturgeon Lake Beach	60	12	20	**N**		
21SLlb	Jumper Camp	58	13	2	**N**		
21SLlc	Ladle Camp	58	13	7	**N**		
21SLld	South Calvin Creek Camp	58	13	13	**N**		
21SLle	Skibo	58	13	28	**N**		
21SLlf	Skibo Railroad Station	58	13	28	**N**		
21SLlg	St. Louis River Camp	58	13	33	**N**		
21SLlh	Skibo Mill Camp	58	13	35	**N**		
21SLli	Skibo Dam	58	13	36	**N**		
21SLlt	Pineville	58	15	6	**N**		
21SLmg	Stubble Creek Mill	59	12	7	**N**		
21SLmh	Far West Dunka Camp	59	12	8	**N**		
21SLmi	Lectionary Camp	59	12	18	**N**		
21SLmj	Tired Trapper	59	12	19	**N**		
21SLmk	Messina Homestead	59	12	20	**N**		
	Messina Homestead	60	14	33	**N**		
21SLml	Naptha Camp	59	12	22			
21SLmm	Obsecrated Camp	59	12	28	**N**		
21SLmo	North Partridge Camp	59	13	16	**N**		
21SLmp	South Branch Bridge	59	13	22	**N**		
21SLmn	Knox (Knott) Camp	59	13	12	**Y**		**Y**
21SLmq	Isle of Fun Camp	59	13	31	**N**		
21SLnh	Dunka	60	12	9	**N**		
21SLni	Little Snort Cabin	60	12	12	**N**		
21SLnj	Old Airstrip	60	12	23	**N**		
21SLnl	Norway	60	15	10	**N**		
21SL	NorthMet Site	59	13	2	**Y**		**Y**

1.6 Other Environmental Studies

Previous mining exploration and environmental studies compiled extensive mapping and aerial photography for portions of the APE including Survey Area One and Two. Studies conducted by Barr for the Project Area provided on-site contextual information for the archaeological and historical studies for the current project and can assist with the predictive modeling for navigable streams and lakes described above.

For example, wetland type evaluation was completed as part of the wetland review process for a 23,927-acre area including land surrounding the Mine Site (referred to as the Mine Site Area; Map 6) and a 19,397-acre area around the Tailings Basin (referred to as the Tailings Basin Area; Map 7). There were 11,195 acres and 8,606 acres of wetlands identified within the Mine Site and Tailings Basin areas, respectively.

The wetland types include coniferous bogs, open bogs, coniferous swamps, hardwood swamps, alder thicket or shrub-carr, deep and shallow marshes, some open water (Barr memo to Corps, 21 December 2010). Descriptions of these wetland types can occasionally be combined with place names identified on early maps, such as the "One Hundred Mile Swamp" in Survey Area One. Map overlays of this information were created wherever possible.

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2.0 BACKGROUND AND METHODS

In 2010,the Corps required the development of the current study as a result of consultation with the Consulting Bands. The purpose is to identify historic properties of traditional spiritual and cultural significance to the Consulting Bands that may be affected by the Project. Planning for this effort was outlined in a January 14, 2010 memorandum prepared by the Corps (Appendix Section 6.8). The memorandum proposed evaluation of mining impacts to Treaty of 1854 resources and historic properties:

> Pursuant to our responsibilities under Section 106 of the NHPA, the Corps has a responsibility to make a reasonable, good faith effort to identify historic properties of traditional religious and cultural significance to Indian tribes, consider the effects resulting from activities the Corps authorizes on those properties, and provide the ACHP an opportunity to comment in regard to such activities.

Although each component of the current study was a generally independent undertaking, each was intended to provide information for other components and to be integrated into a final report of findings and recommendations. All features noted by each component of the work (Band elder interviews, historic context development, plant surveys, and reconnaissance-level archaeological fieldwork) were plotted on topographic and aerial maps, ultimately providing for a summary and overlay of all information.

The previous studies discussed in Section 1.4 were focused on archaeological and architectural resources and some also evaluated the potential for mining landscapes eligible for the NRHP. None focused on identification of historic properties of spiritual and cultural significance to Indian tribes.

2.1 Project Workgroup

A workgroup was established to plan project components. An initial meeting was held on March 29, 2010. PolyMet staff; Bois Forte, Grand Portage, and Fond du Lac Band representatives; Corps archaeologists; Barr staff; historian Carole Zellie of Landscape Research LLC, and consulting botanist Deb Pomeroy comprised the group. Subsequent conference calls were scheduled and informal meetings were held on site during four field trips to the project area between April and October 2010. The Corps also conducted a field visit in June 2011. Another visit was conducted in June 2012 and included SHPO archaeologist, David Mather, and Bad River Band THPO, Edith Leoso.

2.2 Cultural Landscape Definition

The identification of historic properties of spiritual and cultural significance to Indian tribes is embedded within a cultural landscape study and relies on information provided by that community. Definition of a cultural landscape can be interpreted differently across many disciplines including ethnography, geography, anthropology, and history. Cultural geographer Carl Sauer defined landscape as " . . . an area made up of a distinct association of forms, both physical and cultural" (Sauer 1925:27). Tools for identification, evaluation, and protection of cultural landscapes are provided in a number of publications. The NPS offers the following definition of a cultural landscape:

> a geographic area, including both cultural and natural resources and the wildlife or

> domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values (*Cultural Resource Management Guidelines,* NPS-28*)*.

This definition recognizes both natural and cultural resources as important and integral to the concept of a cultural landscape. The interaction between ecosystem and the construction of cultural landscapes is complex. One study observed:

> Ecosystems are somewhat self-contained physical and biological systems, which are nested like sets of increasingly larger bowls sitting together one inside the other. Ecosystems tend to be bounded watersheds and often have unique soils, microclimates, plants, and animals; ecosystems also tend to be bounded in the minds of people who use them; human boundaries, however, may not necessarily coincide with biological boundaries. When ecosystems, or portions thereof, become a part of the human environment, it is said they are *socially constructed*. This term implies that, through behavioral interactions between humans and nature, animals, plants, rocks, and water of an ecosystem acquire new shapes and meanings. Such social constructions of nature may be called, in turn, *cultural landscapes* (Zedeno et al. 2001:18).

In the Indian landscape, there is no barrier between nature and culture and the scale of the landscape potentially extends over a vast territory. Nevertheless, it is important to attempt to identify and locate the resources, describe their general distribution and significance, and determine the relevant historic contexts, values, and associations that make the resource historically significant. There are four types of cultural landscapes that are not mutually exclusive (*Cultural Resource Management Guidelines,* NPS-28):

1. historic sites;
2. historic designed landscapes;
3. historic vernacular landscapes;
4. ethnographic landscapes.

NRHP Bulletin 38 notes that ethnographic landscapes contain natural and cultural resources that people associated with these features define as heritage resources. Although they must consist of tangible properties, these landscapes may possess significant intangible qualities more likely to emerge in the course of conducting research and interviews and less easily recognized on the ground. Bulletin 38 provides guidance on traditional cultural properties that may qualify as ethnographic landscapes, including contemporary settlements, sacred sites, and important topographic features. These landscapes can also include individual components, such as plant communities or ceremonial grounds (Parker and King rev. 1998).

Historic contexts describing broad patterns of Indian occupation on ancestral lands can be developed with published sources, along with histories of European discovery and permanent Euro-American settlement. As noted above, the study and identification of historic properties of spiritual and cultural significance to an Indian tribe, however, must rely on information provided by that community.

2.3 Ethnographic Research and Background Studies

Ethnographers, historians, and others have conducted numerous studies of many aspects of cultural landscapes important to Indian tribes across the United States. There is great variety of methodology and scope. Some of the most recent studies have addressed potential NRHP-eligibility.

2.3.1 *The Cultural Meaning of Coldwater Spring* (2006)

Understanding and assessment of resources significant to native peoples is part of many cultural resource evaluations conducted in Minnesota and the Upper Great Lakes region. One recent ethnographic study in Minneapolis provided information about the meaning of Coldwater Spring to the Dakota. Camp Coldwater, near the confluence of the Minnesota and Mississippi rivers in Hennepin County, was the location of a military encampment during the construction of Fort Snelling (1820-ca.1822) and the site of a subsequent Euro-American settlement. It is significant for its role in the early white settlement of Minnesota and "has been described as culturally important to Dakota and Ojibwe communities" (Terrell 2006:3). *The Cultural Meaning of Coldwater Spring: Final Ethnographic Resources Study of the Former U.S. Bureau of Mines Twin Cities Research Center (TCRC) Property, Hennepin County, Minnesota* (2006) attempted to "identify the relationships of American Indians with the land, natural resources, and cultural resources located within the boundaries of the 27.32-acre TCRC property, and to explore and document such affiliations, if present, be they precontact, historical, or contemporary" (Terrell 2006:*i*).

The study relied on consultation, archival research, and interviews. Identified ethnographic resources were evaluated "for their eligibility for listing in the NRHP as traditional cultural properties (TCPs) within the context of American Indian history within the State of Minnesota and contemporary cultural use and to determine their status as Sacred Sites" (Terrell 2006:*i*). Extensive interviews were conducted with seven official representatives of federally recognized Dakota communities, as well as with six Dakota key cultural experts. They provided information about the spiritual significance of Coldwater Spring, and noted that although they did not identify any particular plant species on the property, certain medicinal plants "are present only in the unique environment provided by natural springs and their surroundings" (Terrell 2006:62). Interviews with Ojibwe tribal members included one group interview with three official representatives from the White Earth Band of Chippewa and one group interview with two members of Ojibwe communities, one of whom was a key cultural expert (Terrell 2006:64). The study noted:

> Springs are considered by the Ojibwe to be particularly significant water sources. Water from springs is considered inherently pure because it comes directly out of the ground. For that reason it can be used for sweat lodges and other ceremonies (Terrell 2006:65). One Ojibwe interviewee said of springs, “Knowing that it came up through Mother Earth and that it was filtered in this loving caring way . . . and having an understanding of that . . . is why these things are treasured, because we know that is the purest water” (Dorene Day, personal communication, August 30, 2005 in Terrell 2006:65).

2.3.2 *Traditional Ojibway Resources in the Western Great Lakes* (2001)

An extensive study of the Lake Superior Chippewa conducted between 1996 and 2001 was very useful to the current study. The NPS prepared *Traditional Ojibway Resources in the Western Great Lakes: an Ethnographic Inventory in the States of Michigan, Minnesota, and Wisconsin* (2001) to provide information useful in managing resources at four NPS units in the Midwest Region: Sleeping Bear Dunes National Lakeshore, Michigan; Pictured Rocks National Lakeshore, Michigan; Apostle Islands National Lakeshore, Wisconsin, and Voyageurs National Park, Minnesota. The research relied extensively on interviews with Ojibwe Band elders, including those from the Bois Forte Reservation. Evaluation for NRHP eligibility was not addressed, but the study provided extensive information about traditional Ojibwe use of natural

resources. The study notes that *ethnographic resource "*both describes a perspective on, provides a methodology for, the study of material, cultural, and spiritual linkages between people and the natural environment." It conveys the "broadest possible range of natural and cultural materials, features, and places that are linked by a subject community to the traditional practices, values, beliefs, history, and/or ethnic identity of that community" (Zedeno et al. 2001:1).

Traditional Ojibway Resources observes that many types of stories are all intertwined in the layering of cultural landscapes. They include stories of holy lands: "where the Creator placed a people;" of migration along specific routes; of regional landscapes anchored by specific landscapes and land and resource use patterns; observations of specific ecoscapes such as wetlands that define use patterns; and specific landmarks such as a sugarbush or a rock outcrop (Zedeno et al. 2001:1).

Interviews provided a framework for the NPS study, and were conducted with members of ten tribes across three national parks. In Minnesota, the Bois Forte Band of Minnesota Chippewa, the Mille Lacs Band of Chippewa Indians, and the Red Lake Band of the Chippewa Tribe expressed initial interest in participation. A detailed survey instrument was developed. Archival research described the history of Ojibwe land and resource use including use of ethnographic resources—plants, animals, minerals, and landscape features (Zedeno et al. 2001:1).

2.4 Overview of Cultural Landscape Study Components

The Corps established specifications for the four-part organization of the NorthMet Cultural Landscape Study; some specifications were modified in the field as required (Corps 2010:2; Appendix Section 6.8). As noted in 1.0, the cultural landscape study analyzed the results of:

1. Band elder interviews;
2. historic context development;
3. plant surveys;
4. reconnaissance-level archaeological fieldwork.

All project components contribute to the identification of historic properties of spiritual and cultural significance to Indian tribes. Research for each relied on a variety of cultural, historic, scientific information from many fields. Throughout the study, historic and contemporary maps provided a framework for gathering diverse types of information and reporting results. Because of the need to conduct plant surveys at specific times between April and October, and the amount of time needed to conduct the interviews and compile the maps, it was necessary to utilize an iterative process. Information was shared with the group as it was developed, with new data assisting in planning each new round of fieldwork.

2.4.1 Band Elder Interviews

During 2010 and 2011, the Bois Forte, Fond du Lac and Grand Portage Bands conducted interviews with elders (see Sections 2.4.1.1-2.4.1.3; Appendix Section 6.5). The Bands were contracted by PolyMet to conduct the interviews. The objective of the interviews was to gain understanding of the beliefs and traditions associated with many aspects of the landscape, and particularly to identify areas of concern, or significance, and understand how resources might have been used by native people. Such traditional ecological knowledge and wisdom (TEKW or TEK) is increasingly acknowledged by the scientific community as an authoritative source of information. TEKW is described as "a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission,

about the relationship of living beings (including humans) with one another and with their environment" (White 2002:1).

The interviews conducted by the Bands focused on the boundaries of the APE and, where possible, on Survey Areas and One and Two (Maps 1- 2). Individuals' familiarity with this specific landscape, however, has been impacted by dislocation from it, as well as mining, logging, and permanent white settlement. Interviews were conducted in homes and in community settings. A variety of historic and contemporary maps were available to the interviewees. Interview methods are described below and in Appendix Section 6.5.

In June 2011 additional interviews were conducted by Carole Zellie of Landscape Research and Rachel Walker of Barr (Section 2.4.1., 4-5). The interviews were conducted at the Bois Forte Heritage Center, the Vermilion PowWow in Tower, Minnesota, and at the Grand Portage Reservation. As noted by William Latady of the Bois Forte THPO,

> sharing information on resources that comprise cultural identity with outsiders is carefully considered by tribal members because history has shown the information may be misused and/or exploited at the expense of the individual, tribe or resource. In some instances it is taboo to discuss activities with others and prohibited for another to ask. This methodological and sampling problem results in the under-representation of historic properties of religious and cultural significance to Indian tribes in resource inventories (Latady and Isham 2011:1).

The interviews were open-ended, but general questions included:

> 1. The "mosaic of important places" or "mental map" of each elder. Questions included places where each has lived, and where activities such as plant gathering, ricing, sugaring, hunting, fishing, took place. Where did parents and grandparents and other family members live and conduct these activities? How did the places and practices change over time?
>
> 2. The spiritual and cultural meaning of traditional activities including ricing, sugaring, plant gathering, hunting and fishing, to the individual and the community.
>
> 3. The ceremonial practices associated with landscape resources, such as tobacco offering.
>
> 4. General or specific comments about trails or routes within the study area or within other familiar landscapes.
>
> 5. Prominent natural features, especially the Laurentian Divide, outcrops, and vistas, and routes leading to sacred places along its length.
>
> 6. The traditional names of lakes, streams, outcrops, and hills, and if there are important views or viewsheds associated with these places.
>
> 7. Recollections of stories or oral histories of the area.

Information from the interviews is cited throughout the current study. The following provides a summary of four collections of interviews.

2.4.1.1 Bois Forte Interviews

"Identification of Historic Properties of Traditional Religious and Cultural Significance to the Bois Forte Band in the NorthMet Project Area of Potential Effect" (Latady and Isham 2011; Appendix Section 6.5.1) was based on interviews with eleven elders and two non-Band members. They identified a number of activities ranging from subsistence to spiritual. They also commented on the potential impact of mining activity within the APE (Latady and Isham 2011:4-6). Band member and elder Marybelle Isham conducted the interviews with Phyllis and Bobby Boshey, Clifford Sam, Knute Grave, Kenneth Boney, Raymond Boshey, Warner B. Wirta, and Jim and Becky Gawboy.

The Bois Forte report noted that elders "recalled general use of the area by family or Band members" and four elders noted trails that were used for hunting, fishing and plant gathering (Latady and Isham 2011:3). Wild ricing, hunting and fishing were also mentioned as having occurred within the APE by relatives and other Band members, if not themselves:

> They recalled use of the area by relatives, and occasionally the type of resource (wild rice, maple sugar, berries, and birch bark), although little information on location was provided (Latady and Isham 2011:3).

Sacred and spiritual activities were also identified, including those associated with the Laurentian Divide.

Few specific locations were identified where usufructuary treaty rights were exercised. (Usufructuary rights are those to hunt, fish, and gather forest products off of the land.) Detailed information, however, about the sugar camp in Section 11 of T59N, R14W at "Spring Mine, Mesaba" was offered by one elder and included a black and white photograph dating from 1942 (Latady and Isham 2011:4).

Areas with potential for sacred or ceremonial use were noted, and included reference to the Laurentian Divide. No further locational information was provided.

The early 20th-century use of passenger trains to reach traditional areas was noted, and "suggests that at least some traditional means of access were used less frequently once other means of transportation became available and may help explain the overall lack of information about trail location and specific function" (Latady and Isham 2011:4).

Marybelle Isham observed that specific collection sites for flowers, plants, roots or bark were not identified, as only the “person making the medicine knew the whereabouts of the plant needed" (Latady and Isham 2011:6).

Transcripts of interviews conducted in 1996 as part of the “Vermilion Lake People: Vermilion Lake Bois Forte History Project” were also consulted. Interviewees were Mary Anderson, John Boshey, Phyllis Boshey, Walter Caribou, Ernestine Hill, Mary Jordain, Marge Konu, Martha Martilla, Bob Ottertail, Annie Pete, Frank Teutloff and Jim Windigo (MHS OH 108).

2.4.1.2 Fond du Lac Interviews
Fond du Lac interview results were not available.

2.4.1.3 Grand Portage Interviews
Grand Portage interview results were not available.

2.4.1.4 Rose Berens, Bois Forte Tribal Historic Preservation Officer
Carole Zellie of Landscape Research LLC conducted an interview with Rose Berens, Bois Forte Band Elder and Tribal Historic Preservation Officer, on May 11, 2011 at the Bois Forte Heritage Center (Appendix Section 6.5.2). As quoted throughout Section 3.0, Berens provided detailed information about wild rice, trails, hunting, and maple sugaring practices as well as the spiritual significance of natural resources.

2.4.1.5 Interviews at the Vermilion PowWow, Tower, Minnesota

Carole Zellie of Landscape Research LLC and Rachel Walker of Barr interviewed six Bois Forte Band members and elders on June 17 and 18, 2011 (Appendix Section 6.5.3). Bev Miller, Bois Forte Band member and staff at the Bois Forte Heritage Center, assisted in organizing the interviews. Harold Goodsky, Henry Goodsky, Ron Geshick, Elaine Tibbetts, and Phylis Boshey were interviewed in addition to Bev Miller. (Phyllis Boshey was also part of the Bois Forte interviews; see Section 2.4.1.1). All grew up at Nett Lake, and three still live on or near the reservation. All were generally familiar with the NorthMet area, but Phyllis Boshey was the only person with detailed information about specific streams and lakes. The Laurentian Divide was mentioned by several: Ron Geshick reported that "Mesabi means Giant; [there is a story] that a giant appeared [in some location on/near] the Laurentian Divide (Walker and Zellie 2011, Appendix Section 6.5.3).

2.4.2 Cultural Landscape Historic Contexts

Historic contexts provide a framework for the evaluation of cultural landscape resources. Every cultural landscape is potentially related to one or more historic contexts that provide the basis for understanding significance. Historic contexts developed for a cultural landscape include information related to a specific theme, chronological period, and geographical area. As described in Section 3.0, contexts outline the environmental setting, including geology, landforms, soils, and hydrology. For the Pre-Contact and Contact periods including Ojibwe settlement of the area, food and medicinal plants, wild rice and maple sugar, culture, trails and portages and Euro-American exploration are detailed. Other themes with an impact on the Ojibwe landscape, including the U.S. General Land Office (GLO) survey, road and railroad development, lumbering, agriculture, and mining, are also discussed in the contexts.

Historic maps and aerial photographs, manuscript collections and published works, and analysis and recordation of GLO surveyors' field books and the Trygg Map (1966:17; Map 9) provided background for historic context development. Wherever possible, results were coordinated with fieldwork conducted for the plant community surveys and Band elder interviews. Information about place names, trails, portages, and major landscape features such as hills and overlooks were of particular interest to the plant community surveys and Band elder interviews.

Extensive research of GLO field book records was conducted for the entire APE (Map 1). As discussed in Section 3.1.3, trail location and vegetation data from the field books was mapped to create a framework to guide the survey work and to suggest areas of highest potential for

properties of spiritual and cultural significance to Indian tribes. As noted in Section 1.4.1, predictive models utilized for previous archaeological studies within and adjacent to the APE further informed the plant survey and archaeological reconnaissance fieldwork design.

2.4.3 Plant Survey

Traditionally, the Ojibwe relied on wild plants for subsistence, economic, cultural, spiritual, and/or medicinal purposes and these plants remain important today. Early efforts to identify and record the traditional Native American use of plants include those by ethnographers Gilmore and Densmore. Nearly one hundred years ago, ethnologist Melvin Gilmore wrote about the use of plants by Indians of the Missouri River region,

> . . . another potent reason for gathering such information while it may still be obtained, before the death of all the old people who alone possess it, is that it is only in the light of knowledge of physical environments that folklore, ritual, ceremony, custom, song, story, and philosophy can be interpreted intelligently. The intellectual and spiritual life of a people is reflected from their material life. The more fully and clearly the physical environment of a people is known the more accurately can all their cultural expressions be interpreted (Gilmore 1919:6).

Frances Densmore's early 20th-century work with Ojibwe Bands in northern Minnesota provides a partial foundation for the study of medicinal plants as well as wild rice and berry harvesting and maple sugar production (Densmore 1928:119-28). Densmore also describes the seasonal cycle of fishing, hunting, and trapping. More recent ethnobotanical studies have been conducted in the Upper Midwest, and some provided a background for the current project (Zedeno et al. 2001).

The primary objective of the plant surveys was to estimate the distribution and abundance of plant species within the various vegetation communities in Survey Areas One and Two, and to provide baseline information to assist in identifying specific areas of these natural resources that are traditionally gathered and culturally significant to the Bands. An effort to identify plants with Ojibwe as well as English and Latin plant names was made throughout the project.

Figure 3. Project team in Section 11 of T59N, R14W, 6/9/2010. Landscape Research LLC photo.

Botanists and environmental scientists from Barr Engineering Company (Barr), the Fond du Lac Band; the Grand Portage Band; the Bois Forte Band; the Corps, and consulting botanist Deb Pomeroy participated in this effort. The focus was on Survey Areas One and Two (Maps 1-2). As described in Section 3.2.8, during the course of the project plant identification and related fieldwork became increasingly focused on areas adjacent to trails, accessible water bodies, elevated areas and promontories, and other features such as a sugarbush site.

2.4.4 Archaeological Fieldwork

Bradley Johnson of the St. Paul District Corps conducted reconnaissance-level archaeological fieldwork in Survey Areas One and Two between April and October 2010, in June 20111 and in June 2012 (B. Johnson 2012). The objective of the fieldwork was to identify the location of potentially NRHP-eligible historic properties of spiritual and cultural significance to Indian tribes. Band members, THPO staff, USFS staff, and the consultants participated in the fieldwork (Figure 3). Pre-Contact and Contact Period resources were investigated, including trail segments, upland areas, a sugarbush site near Spring Mine Lake, and a Partridge River site. The fieldwork relied on information supplied by Band members, maps compiled from GLO surveyor's field books and the *Composite Map of the United States Land Surveyor's Original Plats and Field Notes* (Trygg 1966:17). Sections 3.2.10.2 (sugarbush), 3.2.11.1 (overlook) and 3.2.12 (trails) further discuss the archaeological fieldwork.

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3.0 CULTURAL LANDSCAPE HISTORIC CONTEXTS

3.1 Sources and Methods

The cultural landscape historic contexts were developed through literature review and background research, evaluation of the plant surveys, wetland studies, and other data generated by Barr, and review and analysis of the results of Band elder interviews. Where pertinent, a summary of plant survey or other study methods and results related to each historic context follows the text.

3.1.2 Literature Review and Background Research

Literature review and background research were conducted during the course of the cultural landscape study to develop the historic contexts and to contribute to interviews with Band elders and plant survey and archaeological fieldwork.

Relatively few published sources provide information explaining the significance of the study area and the larger project area to indigenous populations. The available history of European exploration, and Euro-American settlement and land use, can be overlaid on the natural history of the area to understand how these new landscapes were laid over past landscapes (Button 1999:9).

Documentation of the landscape prior to the arrival of fur traders, loggers, miners, farmers, and other permanent white settlers is based on Pre-Contact historic contexts developed by geologists and archaeologists, as well as records of the European fur trade beginning in the early 17th century. Other records include explorers' maps, 19th-century published maps, and St. Louis County public land survey field books (1872-1882). The *Composite Map of United States Land Surveyor's Original Plats and Field Notes* (Trygg 1966:17), which relied on 19th-century GLO field books as well as anecdotal information, was also useful.

Ojibwe histories include accounts by 19th-century Euro-American historians as well as a diverse collection of oral histories, studies of the Ojibwe language, and scholarly works by Band members. Those consulted include *Ojibwe: We Look in All Directions* (Peacock and Wisuri 2002); *Traditional Ojibway Resources in the Western Great Lakes: An Ethnographic Inventory in the Midwest Region* (Zedeno et al. 2001) and *Living Our Language: Ojibwe Tales and Oral Histories* (D. Treuer, ed. 2001). St. Louis County histories, historical plat maps including Hixson (1916), Great Northern Ore Properties Maps (1955 and 1959), aerial photographs (1940-1960), and United States Geological Survey (USGS) topographic quadrangles (1949-1984) were also examined. County plat books (1916–2008) also document landscape change. *Duluth and St. Louis County, Minnesota: their Story and People* (van Brunt 1921) and *Iron Frontier* (Walker 1979) provide accounts of trails, roads, and lumber and mining industries. The extensive literature on Mesabi iron range geology and mining, most notably that by Winchell (1878–1911), Leith (1903), and many others, also provides information about early routes and place names. Aerial photography, including 2010 work by Barr flown over Survey Areas One and Two, also provides a catalog of terrain and vegetative communities.

3.1.3 U.S. General Land Office (GLO) Survey Field Books

Field books compiled by GLO surveyors for townships within the APE were an important source of information. Narrative summaries accompanying the field book notations offered a snapshot of each township:

> This Township contains no lands subject to cultivation, the South half being generally burnt over stony to light soil. The North half is principally swamp covered with a growth of small spruce, cedar, and tamarac trees. There is a small lake (meandered) in sec. 4 & 5 which contains about 45 acres. The banks are low and wet, the lake being surrounded by wholly by swamp. The Township is well watered. Whiteface River running from the NE corner to the SE corner and in sec. 33 forming a junction with Seven Beaver River, thereby forming the headwaters of the St. Louis River. The variation of the magnetic needle was rather changeable in the NW portion of the Township as will be seen by reference to notes of those lines.
>
> Surveyor's summary notes, T59N, R13W, along line between Sections 25 and 36, October 14, 1873 (Survey Area One)

The first U.S. General Land Office land survey of Minnesota was conducted during 1848–1907. The survey was conducted prior to land sales and established the legal description of parcels. The field books have been scrutinized by several generations of scientists, archaeologists, historians, and geographers for information about the landscape. Many articles and dissertations rely on the data for the reconstruction of native species, although there is debate about the reliability of extrapolating bearing and witness tree data to large areas (Wang and Larsen 2006). In 1946 the General Land Office became the Bureau of Land Management in the U.S. Department of Interior (Anderson 1996:2).

The field books for townships within the study area were compiled ca. 1872–1883 and provide a variety of information very useful to this study, including a selective description of mid-19th century timber and undergrowth, water features and terrain, and geological features (see Appendix Section 6.7.) The books also note the location of Indian trails and portages as they intersected a specific survey line. Following the survey, summaries like the one shown above assisted the GLO in compiling township maps (Map 8).

3.1.3.1 Field Book Study Description and Methods

The field books were analyzed between April and September 2010. Books for the survey area were identified at MHS. The field notes are contained in 5 x 9-inch, leather-bound books. The ruled pages have handwriting of varying descriptions and legibility. MHS staff photocopied the books with an overhead machine; copies are generally quite close to the legibility of the originals (Figure 4). A 2010–2011 project conducted by the Minnesota GeoSpatial Information Office digitized the Minnesota collection but records were not available in time for this project.

The surveyors generally only recorded data along the section lines, not within the section. Meanders were made for streams and some other water features. The surveyors' books were the basis for historic township maps produced by the surveyor general's office. The series for the study area was retrieved from the public land survey plat map retrieval system at http://www.mngeo.state.mn.us/glo/index.html (Map 8).

All field notes for T58N, R13-15W, T59N, R12-15W, and T60N, R12-15W, representing a portion of the APE and containing all of Survey Areas One and Two, were reviewed by the consultants and organized into a summary chart organized by section. Survey section line, book and page number, and survey date were transcribed, and surveyors' notes from each page were organized by trail, tree, undergrowth, and terrain and water feature comments. Trees were reported in the order given by the surveyor, and species were only noted once. Landscape descriptions, including a summary of timber, were transcribed as written by the surveyor

(Appendix Section 6.7). The location of trails and streams was given in chain measurement as a chain measurement from a section corner as noted by the surveyor. The current study did not report the location of bearing and witness trees, although they are noted in the tree list. The bearing trees and all other data can be located by using the index page included with each surveyor's book. (A database of Original Land Survey Bearing Trees is available at http://deli.dnr.state.mn.us/metadata/pveg_btreept3.html.)

Any place names and features such as ledges and hills noted by the surveyor were added to Table 5. Trails and other features were plotted on maps for use in the tribal-elder interviews, plant surveys, and archaeological reconnaissance.

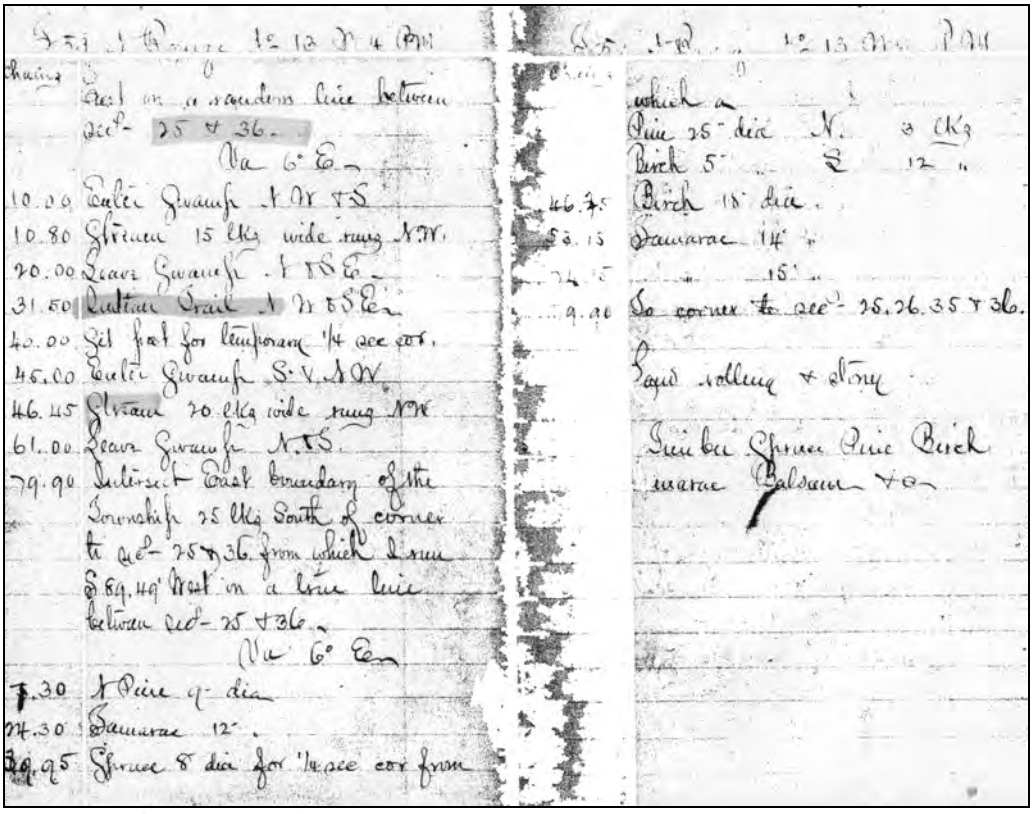

Figure 4. Field Book for T59N, R13W; survey line between Sections 25 and 36 are adjacent to Survey Area One, 10/14/1873.

3.1.3.2 J.W. Trygg Map: Sheet 17

The "Trygg Maps" are a standard reference for many types of historical research. The *Composite Map of United States Land Surveyor's Original Plats and Field Notes* (Trygg 1966) was compiled by J. William Trygg (1905–1971). A forester and land appraiser, he established the Trygg Land Office in Ely, Minnesota in 1955. He prepared appraisals for various Indian lands already ceded to the United States, and compiled 23 maps covering Minnesota. The maps relied on 19th-century GLO survey field books and other historical information from undetermined sources (MHS 2010). The maps show Indian trails, portages, and habitation sites, and sites associated with European exploration, early permanent white settlement, lumbering, and mining. Sheet 17 provides coverage for the APE (Map 9). In addition to the maps, Trygg prepared abstracts of GLO field books (MHS 2010).

One of the most important aspects of the GLO field book study (Section 3.1.3.1) was the opportunity to see how closely the trails shown on the Trygg Map corresponded to the original surveyor's field book notations. Each source makes a unique contribution to the study; the field books provided information about terrain and vegetation (albeit along a single survey line), and did yield additional information about trail segments and other features, while the Trygg Map provides a broad overview and summary of a large area.

Along with the data points obtained from the surveyor's field books, points obtained from Trygg along with information about prominent landforms and other features was used to plan the plant surveys and fieldwork. Place names and other information were also added to Table 5.

3.2 Environmental Context

3.2.1 Regional Geology

The Giant Man

> *Messabay (Missabe Widjiw)—the Laurentian Divide—stretches to Thunder Bay and there are many points of connection. We recognize the power of the area, which means Giant Man. The Giant Man walked across the land and his footsteps created the Laurentian Divide. When he reached Thunder Bay he laid down and went to sleep. We believe he will rise out of the water.*
>
> Rose Berens, Bois Forte, 5/11/11 (Zellie 2011, 6.2.5)

The Project Area is located at the foot of the Laurentian Divide and between the headwaters of the Embarrass and Partridge Rivers. The area possesses great significance for the Ojibwe as well as for geologists (Figures 5, 8). The geologist's term "Giant's Range" refers to the great body of granite that lies between the Mesabi and Vermilion iron-mining districts, and which is locally referred to as the Embarrass Mountains. In 1843 Joseph N. Nicollet mapped the highland range as Missabay Heights; in 1848 Joseph G. Norwood called it Missabe Wachu, or Big Man Hills. In 1886 Joseph Gilfillan noted the Ojibwe names as "missabe wudjiu (*widjiw*) or "Giant Mountain" (Upham 1969:504). Giant's Range is part of the Laurentian Divide, which separates the watershed of streams that flow north to the Arctic Ocean from the watershed of streams that flow south through the Great Lakes to the Atlantic Ocean (Ojakangas and Matsch 1982:184).

Understanding of the area's landforms, vegetation, rivers, and wetlands provides a basis for understanding how a pre-Contact period population would distribute themselves and use these resources. Native Americans had extensive knowledge about this unique landscape at the foot of the Giant's Range (Figure 5). The general region did not escape notice by mid-19th century Euro-American explorers and geologists, and even writers of guides to Minnesota Territory:

> A mountain extends all the way between the St. Louis River and Pigeon River. It evidently abounds in copper, iron and silver. The terrestrial compass can not be used there, so strong is the attraction to the earth. The needle rears and plunges "like mad."
>
> J. Wesley Bond, *Minnesota and its Resources* (1853)

Survey Area One and Two are located within the Laurentian (or Superior) Upland physiographic area. Glaciation that took place repeatedly during the Pleistocene Epoch (2.6 million years to 12,000 years ago) is largely responsible for shaping the landscape in the area. The Minnesota Department of Natural Resources (MNDNR) has classified the ecological landscapes in the area as part of the Northern Superior Uplands Section, with the area to the north of the Giant's Range a part of the Nashwauk Uplands subsection, and the area to the south part of the Laurentian Uplands subsection (Map 10). Landforms in both these subsections are characterized by till and outwash plains and moraines, with peatlands also common in the Laurentian Uplands subsection. The legacy of glacial erosion and deposition responsible for the shape of the landscape, however, was controlled in large part by the underlying bedrock geology.

Bedrock to the north of the Giant's Range is made up of metamorphosed Archean (2.8 – 2.5 billion years old) volcanic and sedimentary rocks typical of the millions of square miles of glaciated Precambrian shield exposed in Canada. These rocks are intruded by granitic intrusive bodies, of which the Giant's Range granite exposed between the survey areas is just one example (Map 11).

Figure 5. The Giant's Range: looking west/northwest along the Embarrass Mountains, west of the NorthMet plant site, 10/13/2010. Barr photo.

South of the Giant's Range, much younger rocks (Paleoproterozoic – 2.5–1.8 billion years old) were deposited on the Archean rocks. The Biwabik Iron Formation (BIF) was deposited in a low energy (deep-water) marine environment during a time beginning about 2.4 billion years ago when photosynthesis by cyanobacteria increased oxygen in the Earth's atmosphere, allowing for the precipitation and deposition of iron-rich sediments. The Virginia Formation was deposited on top of the BIF in a higher-energy (shallower water) environment as a thick assemblage of sands and mud. Much later, at approximately 1.1 billion years ago, the Duluth Complex igneous intrusion was emplaced in the crustal rocks and associated molten volcanic rocks that flowed across the landscape during this time as well (Jirsa et al., 2005).

Much of the present landscape owes its character to the very recent erosion of bedrock by glaciers. Erosion by glaciers took advantage of and scoured along faults, bedding planes, and other weaknesses in the bedrock, leaving harder and more resistant rock behind. Bedrock that had been deeply weathered during a late Cretaceous to possibly Tertiary (65–100 million years ago) weathering episode would have been easily eroded during the many glacial advances (Lehr and Hobbs 1992) of the Pleistocene, leaving behind relatively resistant bedrock outcrops. Giant's Range is elevated above surrounding topography possibly because it was protected from the earlier weathering episode by a cap of iron-rich rock, which has subsequently eroded (Lehr and Hobbs 1992).

Glacially scoured bedrock outcrops are common in the area, and the Survey Area One and Area Two are located on either side of exposed granitic hills of the Giant's Range, which rise to 500 feet above the surrounding landscape. The outcrop of Giant's Range granite and other late Archean metasedimentary rocks makes up the high hills located directly to the east and southwest of the tailings basin (Map 11).

Although glacial erosion tended to dominate this area of Minnesota, the final advances and retreat of the ice during the Late Wisconsin (approximately 30,000 to 14,000 years ago) time period left deposits of glacial till and associated sediments in recognizable landforms such as moraines, outwash plains, and lake deposits. During this time period, the Rainy Lobe of the Laurentide Ice Sheet advanced across the area from the north-northeast (Map 12). The stagnant ice margins of the Rainy Lobe deposited the looping system of moraines in the area as it retreated, locally referred to as the Allen, Wampus Lake, and Vermilion moraines. These glacial landforms are relatively young (15,000–12,000 years; Larson and Mooers 2009). The Wampus Lake moraine is not as well developed as the Vermilion or Allen moraines, but the western end of it intersects the southern portion of Survey Area One (Map 12). Between the moraines, ground moraines were also deposited as a relatively thin veneer of till and associated sediments. The survey parcels are underlain by varying amounts of Rainy Lobe ground moraine.

3.2.1.1 Landscape Features of Survey Area One

A portion of Survey Area One is covered by the One Hundred Mile Swamp, a large, relatively continuous area of wetland overlying the relatively soft (and glacially eroded) Virginia Formation bedrock (Map 11, Figure 6). The deeper erosion of this softer bedrock probably allowed for more accumulation of deep peat deposits, resulting in the large and continuous swamp complex. Further southeast in Survey Area One, the underlying bedrock is the harder and more glacially resistant Duluth Complex. The Rainy Lobe terminated here for a period of time, and deposited thicker glacial deposits forming the Wampus Lake moraine. The till deposits have been eroded by the Partridge River and its network of tributaries, which flow to the southwest over this area, although smaller, discontinuous wetlands are common in this area as well.

Figure 6. Looking northeast across a portion of One Hundred Mile Swamp in Sections 4, 5, 8, and 9, T59N, R 13W, 10/13/2010. Barr photo.

3.2.1.2 Landscape Features of Survey Area Two

The tailings basin in Survey Area Two is underlain by relatively resistant granite of the Giant's Range (Figure 8; Map 11). The granite has been deeply eroded in the northern parts of the parcel, as opposed to the high Embarrass Mountains located to the south of the parcel. The landscape underlying the tailings basin survey area would be similar to that at the Mine Site survey area, except that, during the retreat of the Rainy Lobe north of the Giant's Range, the area was covered by proglacial lakes, as water was trapped between the retreating ice and the Giant's Range. Prior to retreating to the Giant's Range, meltwater had been efficiently channeled away from the ice margin. After retreating further north away from the Giant's Ranges, however, that meltwater became trapped and pooled to form Glacial Lake Norwood (Map 12).

The Embarrass Gap served as a major outlet to the south for these trapped proglacial lakes as the ice retreated (Map 12). The elevation of Glacial Lake Norwood was regulated by the downcutting of the Embarrass Gap and drainage to Glacial Lake Upham, but varied between 1475 and 1430 feet (Larson and Mooers 2009). Persistence of a proglacial lake, which drained through the Embarrass Gap, resulted in much of the area between the Vermilion Moraine and the Giant's Range being wave-washed, and in some places, the area is mantled by glacial lake sediments (Larson and Mooers 2009). This wave action and the deposition of lake deposits cause the landform morphology in the tailings basin survey area to be somewhat more subdued than landforms south of the Giant's Range. Wetland areas become more common to the north, as one moves off the flank of the Embarrass Mountains toward the Embarrass River. These wetland areas are underlain by relatively thin and wave-washed ground moraine and glacial lake deposits from Glacial Lake Norwood.

3.2.2 Regional Soil Development

Once the glaciers retreated, tundra dominated the landscape in the northern part of Minnesota (Wright 1969). Gradually dwarf-birch scrubland became more common and spruce did not arrive for a few more centuries. Eventually the forest changed from spruce-dominated to pine-dominated about 7,000 years ago. As white pine moved into the area from the east, an oak/white pine woodland with prairie openings dominated the area for the next 3,000 years during the mid-holocene period of warmer and dryer conditions. Then another change in the climate caused the spruce to once again dominate the landscape, with its composition similar to the spruce forests 7,000 years ago albeit with the presence of white pine and lowland vegetation.

Following retreat of the glaciers, the lakes gradually infilled and bogs developed. The bogs are dominated by black spruce, tamarack, ericacious shrubs, and Sphagnum moss. The development of the bogs may have been aided by the postglacial leaching of the upland soils, which reduced the mineral contribution to the edges of the lakes and bogs, and promoted conditions favorable to bog development: acid, nutrient-poor waters. Since about 9,000 years ago, the groundwater in the area has generally been decreasing in depth, which has contributed to paludification and the development of peat in small kettle lakes throughout the area (Bjorck 1988).

The transition of vegetation during the postglacial time period was dependent on changes in the climate, however the parent material for the growing medium, soil, was laid down during the retreat of the glaciers. There were multiple glacial stages in the area, but the Wisconsin stage helped to shape the landscape that we see today. The three ice lobes crossing the area left behind distinctive drift or the parent material for the soil today and included the Superior Lobe, the Rainy Lobe, and the St. Louis Sublobe of the Des Moines Lobe. The glacial drift left by the Superior Lobe has a distinctive red color imparted by its parent material Precambian red sandstone and

shale. In contrast, the glacial drift from the Rainy Lobe deposited gray or brown sandy stony till. The third ice lobe affecting the area was the St. Louis Sublobe of the Des Moines Lobe, which deposited a grey or light brown (oxidized) silty till with Paleozoic carbonate and Cretaceous shale. The St. Louis Sublobe was eventually divided into two sublobes by the granitic Embarrass Mountains.

North of the Embarrass Mountains, as the Rainy Lobe retreated, Glacial Lake Norwood formed (Bjorck1988). Except for the Embarrass Mountains, this area is characterized by low relief terrain traversed by small rivers and streams with small kettle lake basins and low areas with peat deposits. Heikkila Lake is one of the larger lakes in the area and it is connected by a flat swampy area to the Embarrass River (Figure 7). Sand, silt and clay are common in this area of Glacial Lake Norwood, which lack the reddish color typical of the Superior Lobe, indicating the main sediment source was meltwater from the Rainy Lobe (Bjorck 1988). The northern slopes of the Embarrass Mountains are composed of sand and gravel commonly found as eskers or hummocks (Bjorck 1988).

Figure 7. Heikkila Lake, looking south across Sections 19 and 30, T60N, R14W, 10/13/2010. Barr photo.

South of the Embarrass Mountains, one of the sublobes of the St. Louis Sublobe advanced after the Superior Lobe retreated, and incorporated reddish-brown sediments into its till (Bjorck 1988). This sublobe advanced into the Aurora area and the southern part of the Embarrass channel. As a result, the red clayey till of the St. Louis Sublobe is found on the southern slopes of the Embarrass Mountains while on the highest parts of the mountains, thin Rainy drift overlies bedrock (Bjorck 1988).

The soils across the area developed in organic deposits, gravelly or sandy outwash, loamy materials or glacial drift, glacial lacustrine deposits, or eolian material. A description of the various soils is provided as follows (USDA-NRCS, 2011):

- Organic soils developed in areas with a high water table and cooler climate where the rate of organic deposition exceeds the rate of decomposition. The soil series include Rifle mucky peat, Greenwood mucky peat, Cathro muck, Tacoosh muck, Bowstring muck, and Sago muck. These soils are very deep, very poorly drained soils that formed in organic deposits. The depth of organic material in Rifle, Greenwood, and Bowstring series is more than 51 inches thick. Some areas may be used for pasture however with the slopes ranging from 0 to 2 percent, drainage of these wetlands is difficult. Some areas of Bowstring have been developed to grow wild rice. Most areas are covered with a mix of native vegetation ranging from trees (black spruce, tamarack, northern white cedar, balsam fir, paper birch, quaking aspen, black ash), shrubs (alder, willow), and ground cover (Labrador tea, leatherleaf, blueberry, bog rosemary, laurel, sphagnum moss, sedge, reed, cattail).

- Soils that formed in sandy and gravelly outwash, sandy glaciofluvial deposits, or lacustrine deposits are very deep and range from excessively drained to moderately well drained soils. These soils can have slopes ranging from 0 to 70 percent. The soil series include Biwabik sandy loam, Graycalm sand, Wurtsmith sand, and Friendship sand. Biwabik and Wurtsmith are typically forested with oak, bigtooth aspen, red maple, paper birch, red pine, and jack pine with understory plants that may include serviceberry, bracken fern, Canada blueberry, and wintergreen. Graycalm is typically forested with northern red oak and some white pine, jack pine, and scrub oak; however some land is cropped. Friendship is typically used for pasture or cropland such as corn, peas, beans or potatoes. The native vegetation is mixed deciduous and coniferous forest with some grass in the understory.

- Soils that formed in loamy glacial till material include Insula gravelly sandy loam, Conic gravelly sandy loam, Eaglesnest stony loam, Eveleth stony loam, Oysterlake stony loam, Babbitt stony loam, Beargrease very stony loam, Rollins sandy loam, Pequaywan fine sandy loam, Shagawa loam, and Gnesen loam. The Insula soil series is a shallow, well drained soil found on bedrock controlled uplands. The Babbitt soil series is a very deep, somewhat poorly drained soil on till plains and till-mantled bedrock uplands. The remainder of the soil series are very deep and range from somewhat excessively drained to somewhat poorly drained. These soils formed in a mantle of loamy material and various underlying materials that includes glacial till or outwash. The native vegetation found on these soils includes mixed deciduous and coniferous forest such as bigtooth aspen, quaking aspen, paper birch, red maple, balsam fir, white spruce, jack pine, red pine, and eastern white pine. The primary uses are related to recreation, timber production, and wildlife resources. Some areas may be used for hayland or pasture.

- Soil series that formed in silty lacustrine deposits include Barronett silt loam. These soils are very deep, poorly drained with slopes ranging from 0 to 2 percent. They are typically formed in still water so that stratified layers are found through the profile. Barronett is primarily pastured or managed for hay production. The native vegetation for this soil includes sedges, grasses and scattered American elm, black ash, aspen, and willows.

Figure 8. Looking south at the Giant's Range (Laurentian Divide) as the backdrop for a portion of Survey Area Two, 10/13/2010. Barr photo.

Wetlands currently comprise 47 percent of the land area in Survey Area One and 44 percent of the land area in Survey Area Two. While some land is used for crops, pasture or hayland in Area Two, there are no cropped areas present in Survey Area One or on the Embarrass Mountains. These areas, however, have an extensive history of logging (see Section 3.2.18). Area One has large complexes of wetlands mixed with uplands that typically have soils that are shallow to bedrock. Bedrock outcrops are commonly found throughout the area. The small open agricultural fields in Area Two are readily visible on aerial imagery and are located on areas where the deep soils developed in loamy glacial till. The soils at the top of the Embarrass Mountains are very shallow to bedrock, stony and not suitable for agriculture. Soils on the side slopes can be very deep, but are stony and some areas have steep slopes.

The soils in portions of Area One and Area Two have been removed or disturbed because of the development of infrastructure such as houses, roads, and agricultural fields, or mining features including pits and haul roads. Area One has about 1 percent of the area disturbed by infrastructure and less than 5 percent of the area disturbed by mining features. Area Two has about 6 percent of the area disturbed by infrastructure or agricultural fields and about 3 percent of the area is disturbed by mining features.

3.2.3 Natural Vegetation

Survey Areas One and Two are currently a mosaic of upland and wetland native vegetation community types. This is more or less consistent with the Marschner map of the areas' pre-settlement vegetation (Map 13). Marschner mapped the area as a mosaic of uplands, comprising aspen-birch, mixed hardwood-pine, jack pine openings and white pine stands, interspersed with conifer bogs and swamps. A notable difference between the Marschner vegetation map and the current distribution of vegetation communities is the near-total loss of white pine from the area (discussed in detail below).

Within the current uplands, fire-dependent community types dominate. These are, as the name suggests, vegetation communities strongly influenced by wildfires. Historically, fire has been the primary influence in these communities on tree mortality, patterns of reproduction, nutrient cycling and the opening of gaps in the canopy for light to reach the forest floor (MNDNR 2003a). Fire has been suppressed for approximately 100 years; however, the fire-dependent vegetation communities persist, in part because logging activities over the past century can exert certain similar influences on vegetation community development.

As detailed in the following sections on food, medicinal and sacred plants (3.2.8), and the logging industry (3.2.18), the loss of white pine as a dominant canopy tree is probably the principal difference between the pre-contact and current upland vegetation communities in the study area. White pine would likely have been the dominant tree in the fire-dependent communities that are seen on the site today. However, white pine was found on only one of the fifteen upland vegetation survey plots during the 2010 survey. In its place, the canopy and subcanopy of fire-dependent communities are now dominated by a mixture of black spruce, white spruce, jack pine, paper birch, quaking aspen and balsam fir. Small red pine stands are also scattered throughout the study area. Since fire-dependent community types persist as dominants in upland areas, many of the shrub and herb species available during the Pre-Contact Period remain in the study area. However, due to continued high deer populations, plant diversity is likely lower than in Pre-Contact communities. Herbivory by deer continues to suppress regeneration of white pine, white cedar, oaks and other species favored by deer.

Wetland communities in the study area are probably somewhat more prevalent now than during the Pre-Contact Period, especially in Survey Area One north of the tailings basin. This is due to increased beaver activity, primarily north of the tailings basin. However, plant species in the various wetland communities now are likely very similar to those Pre-Contact (Maps 14-15).

Figure 9. Looking west at the Embarrass River in Section 17, T60N, R14W, 10/13/2010. Barr photo.

3.2.4 Wildlife Resources

A number of wildlife studies conducted between 1979 and 2010 provided evaluation of the wildlife resources within the APE. Wildlife studies have included observing or identifying sign of amphibians, birds, and mammals during spring and winter surveys. Habitat types observed in the area include open water, palustrine emergent, palustrine scrub shrub, palustrine forests, disturbed areas (roads, logging, etc.), upland grassland, upland shrubland, and upland forest.

Amphibians included spring peepers, western chorus frogs, and painted turtles in wetlands.

Birds included common loon, mallard, green-wing teal, wood duck, lesser scaup, redhead, common merganser, red-breasted merganser, great blue heron, American woodcock, spotted sandpiper, belted kingfisher, eastern phoebe, red-winged blackbird, common grackle, and swamp sparrow, spruce grouse, northern saw-whet owl, barred owl, black-backed and northern three-toed woodpeckers, eastern wood-pewee, common redpoll, and snow bunting. Northern flicker, American robin, American goldfinch, and white-throated sparrow were seen in disturbed areas and grassland/shrubland habitats. The remaining species were primarily associated with forests, including ruffed grouse, ruby-throated hummingbird, yellow-bellied flycatcher, gray and blue jays, ruby-crowned kinglet, pine grosbeak, black-and-white warbler, golden-winged warbler, Magnolia warbler, and yellow warbler. Woodpecker cavities and foraging signs were common on larger snags and on stumps. Cavity-nesting species seen in forests included three species of woodpeckers (hairy, downy and pileated woodpeckers), black-capped chickadee, and red-breasted nuthatch. Broad-winged hawk, red–tailed hawk, turkey vulture, and common raven were seen flying overhead.

Common mammals seen or identified based on sign included bats, black bear, gray wolf, red fox, pine marten, river otter, red squirrel, beaver, white-tailed deer, and moose. Bats were seen flying over wetlands in the evenings during field reviews. Black bear sign was seen in mixed forests and Gray wolf and red fox tracks were seen along Dunka Road and other roads on the site. Pine marten and red squirrel sign was common in spruce forests. River otter mounds and skid trails were seen near Mud Lake. Beaver dams and cuttings were found at several sites and beaver dams created ponds. White-tailed deer and moose sign was observed but especially in forests near wetlands and in shrublands. Other animals observed included least weasel and bobcat.

3.2.5 Pre-Contact-Period Historic Contexts

Historic contexts developed by the Minnesota State Historic Preservation Office (MNSHPO) include those for the recent past (the historic period) as well as the more distant (Pre-Contact) past (MNSHPO 1989). The contexts assist in describing and interpreting the history of the state over specific periods of time and provide a background for study of cultural landscapes.

The Pre-Contact Paleo-Indian, Archaic, and Woodland traditions focus on American Indian communities. A fourth, the Mississippian/Plains Village traditions, are limited to southern Minnesota. Post-Contact period contexts describe initial contact between Europeans and American Indians during exploration and early Euro-American settlement of traditional American Indian lands. Contact-Period contexts include Indian Communities and Reservations, Northern Minnesota Lumbering, and Minnesota's Iron Ore Industry. The following Pre-Contact outline is based on MNSHPO historic contexts (MHS 1989 and 1991), Dobbs (1990a, 1990b), Anfinson (1987) and archaeologists' observations from recent cultural resource studies in the area. These include Thompson et al. (1996), Gronhovd (2007, Gronhovd et al., 2009), and Terrell (2011).

The Paleo-Indian Tradition (12,000 to 8,000 BP [years before the present]) included the retreat of the glaciers from the Minnesota landscape. Since the last glacial ice sheet began to retreat from southern St. Louis County about 12,000 years ago, evidence of the earliest occupation is not expected to date beyond that time. Here and elsewhere in North America, small nomadic bands hunted big game and made hide scrapers, knives, and finely crafted, tapered spear points. At the end of the Pleistocene and the beginning of the Holocene, there was a growing scarcity of big game animals and early people began to consume fish, amphibians, reptiles, small mammals, birds, and plants and relied on gathering wild plants. In Minnesota, glacial destruction eroded the landscape and spear points are among a small amount of evidence collected.

During the Archaic Tradition (8,000 to 2,800 BP), change in climate and diversification in hunting and food preparation was reflected in diverse types of spear points, hide scrapers, knives, and grinding stones. In northern Minnesota the "post-glacial spruce forest was gradually replaced by oak savanna and prairie, which was in turn succeeded by a coniferous forest dominated by pine and fir" (Thompson et al. 1996:9). Whitetail deer were the dominant large game animal. Copper mining during the late Archaic, between 5,000 and 2,500 BP, provided tools, spear points and ornaments. Four distinct Archaic contexts have been identified in Minnesota including the Shield Archaic, Lake-Forest Archaic, Prairie-Archaic and Eastern Archaic. In northeastern Minnesota, Archaic artifacts, including notched projectile points and scrapers, are typically associated with the Shield Archaic. This "hunting and gathering complex takes its name from the Canadian Shield geological formation" and is associated with the "closed coniferous forests of the region" (Dobbs 1990a).

The Woodland Tradition (3,000 B.P. to European Contact) is separated into initial and terminal periods and is the most widespread Pre-Contact cultural tradition represented in Minnesota. The

Woodland Tradition is associated with the introduction of ceramics, the introduction of antler and bone tools, the use of burial mounds, domestication of plants, and establishment of permanent village life. The bow and arrow came into use during this period, and long-distance trade in items such as seashell beads, sheet copper figures, and tools made of exotic stones reached its height. Intensive harvesting of wild rice encouraged the establishment of large semi-permanent villages along shallow lakes and marshes in central and northern Minnesota. A seasonal cycle included spring maple sugaring, summer fishing and small game hunting, summer gathering, fall wild rice harvesting, and winter large-game hunting (Anfinson 1987:222). Woodland sites are not usually as deeply buried as Paleoindian and Archaic sites.

The inhabitants of central and northern Minnesota continued to follow essentially Woodland practices until contact with Europeans. A Late Woodland culture known as Blackduck dominated the region from ca. 1100 BP (Thompson et al. 1994:10). Native Americans affiliated with the Terminal Woodland Sandy Lake culture, dated to ca. 750–200 BP, might also have frequented the iron range area.

3.2.6 Ojibwe Historic Contexts

The Contact Period spans initial contact between Native Americans and Euro-Americans during the mid-17th century to the Treaty of LaPointe in 1854, when Ojibwe were allotted reservations in northern Minnesota. Early in this period, the Siouian speaking people, including the Dakota, occupied much of Minnesota. Dakota Indian villages were of permanent and semi-permanent character, and the economy was based on game animals, fish, wild rice gathering, and some agricultural production. Dakota contact with European explorers and missionaries included Pierre Radisson, Medard Chouart des Groseillers, Daniel Dulhut (Duluth), Pierre-Charles Le Sueur, Robert Cavelier de la Salle and Louis Hennepin. Le Sueur, the commandant of the trading post at LaPointe on Lake Superior's Chequamegon Bay and who traveled throughout the Ojibwe and Dakota territories in ca. 1680–1690, was possibly the first Euro-American to traverse the Height of Land Portage at the eastern edge of the APE (Vogel and Stanley 1991a).

In response to increased European settlement and exploration along the Atlantic coast and in northeastern North America, the Algonquin-speaking Ojibwe (Anishinaabe) moved into Minnesota near the end of Minnesota's Pre-Contact period. Historians note that the "emergence of the Ojibwe as a distinct subgroup is hard to pinpoint, but most likely happened around fifteen hundred years ago" (A. Treuer 2010:5). Notably, in most regions, "every Ojibwa belonged to a patrilineal clan or descent group that was named after a totemic animal;" members of each clan or group were considered close relatives although they might "live hundreds of miles apart" (Peers 1994:22).

The Ojibwe were established around Sault Ste. Marie by the time the French arrived in the Great Lakes at the beginning of the 17th century, but soon migrated into the area around Lake Superior's Chequamegon Bay, continuing a complex westward migration that oral history says began at a great salt water (Terrell 2011:13). Madeline Island was the home of a community estimated at more than ten thousand people who practiced fishing and agriculture. The abandonment of the island after a century of occupancy was attributed to starvation and disease as well as the "coming of Europeans, advent of the fur trade, and the subsequent introduction of the firearm," which accompanied expansion into Wisconsin and Minnesota (Peacock and Wisuri 2002:27).

Treuer observes that the Ojibwe "sustained their families by staying closely connected to the water . . . there is a prophecy among the Ojibwe that they had to move west to 'the land where

food grows on water' " (A. Treuer 2010:10). He notes that this reference to wild rice "was one of the major incentives that brought the Ojibwe from their ancestral homes on the Atlantic Coast to Minnesota" (A. Treuer 2010:10). In 1885, an early Euro-American historian noted that as the beaver population diminished in the Chequamegon region of northern Wisconsin they

> radiated in bands inland, westward and southward towards the beautiful lakes and streams which form the tributaries of the Wisconsin, Chippeway, and St. Croix rivers, and along the south coast of the Great Lake to its utmost extremity, and from thence even inland unto the headwaters of the Mississippi" (Warren 2009 [1885]:126).

By 1760, the Ojibwe territory extended across across Ontario, Quebec, Michigan, Wisconsin, and Minnesota, and occupied a central position in the British and French fur trade (A. Treuer 2010:13). The initial 17th-century fur-trade era was marked by intense competition with the Dakota but an alliance crafted in 1679, which lasted until 1736, resulted in military and economic gains for both (A. Treuer 2010:18-19).

The Dakota migrated from northern Minnesota to the north, south and west. By 1800, the Ojibwe had "exclusive control over the northern half of Minnesota" (D. Treuer 2001:7). The family was the most important social and economic unit, and the semi-nomadic culture was focused on fishing, hunting, and gathering—practices linked by a network of water routes and trails—as well as cultivation of crops such as corn, beans, and squash, and trade (Zedeno 2001:54). The bands gathered in groups of up to 400 in summer, and split into small family groups in the winter. Summer was a time of the ceremonial rounds and pow wows. In northern Minnesota the short growing season and poor soil demanded reliance on plant gathering. In addition to wild rice, the Ojibwe relied on spruce root, birch and cedar bark, sage, and maple sap. They harvested hazelnuts and blueberries and other berries; many were used as medicine as well as food (Zedeno 2001:54). Construction material for shelters, canoes, and other purposes were obtained from a variety of plants, such as twine from spruce root, bark siding from birch, and poles from willow. In northern Minnesota, like in the Northeast, they "cleared land for villages and fields, cut fuelwood and set fires beyond these clearings, exercised a wide indirect influence on vegetation through their hunting, and may have favored or even transplanted food and medicinal plants" (Foster et al. 1998:44). The Ojibwe who moved west "brought with them a culture that had evolved for thousands of years in response to changing environmental conditions and human relationships, modified somewhat by over a century of participation in the fur trade in the forested regions around Lake Superior" (Peers 1994:22).

See Appendix Section 6.6.1 for additional history of the Bois Forte Band (provided by the Band).

Fur Trade

The fur trade flourished on the partnership of European and American traders and Native Americans. It was the basis of the European exploration economy and French fur traders expanded their market prior to the Treaty of Paris in 1763, when the French ceded land claims to Britain. English fur traders and explorers focused on Montreal and Hudson Bay as well as Grand Portage. Competition with British firms increased following the Revolutionary War of 1776 and the expansion of American companies. The Louisiana Purchase of 1803 opened the land east of the Rockies to American interests (Blegen 1963:87; 91-96; 119). U. S. Military explorations included those by Zebulon Pike (1806) and Joseph N. Nicollet (1836–37). Nicollet's "Hydrographical Basin of the Upper Mississippi River" (1843) was the first comprehensive map that included the APE (Figure 34).

Navigable rivers, streams and lakes linked fur traders and Indians. Fur trade activity within Survey Areas One and Two is not documented. However, within the APE, the Embarrass River (Figure 9) along the area's western and northern edge was an important trade route as documented by the Height of Land Portage (3.2.13.1). The Partridge River was also navigable (Figure 10). The Trygg Map (1966:17) notes a number of "trappers trails" in T61N, R10N, more than twelve miles to the northeast of Survey Areas One and Two; none are identified within the APE (Map 9).

Figure 10. Looking southwest at the Partridge River in Section 12, T59N, R13W, 10/13/2010. Barr photo.

Trade with the French brought acquisition of firearms, which was among factors that resulted in the Ojibwe displacing the Dakota as they moved west. During two hundred years prior to its decline in the 1870s, the "extractive nature of the fur trade was ruinous, both in terms of its impact on Native American culture and on the regional ecosystem" (Thompson et al. 1996:15). With decline in fur yields, traders and Native Americans expanded their territories to the western prairies, which "marked the limit of both the Ojibwe culture area and the prime beaver, otter, and marten habitat" (Thompson et al. 1996:15).

3.2.7 Early Treaties

In 1849, Minnesota Territory was created from the former Wisconsin and Iowa territories. At this time, the Euro-American population of the Arrowhead region was probably "less than one hundred, with nearly all males engaged in the fur trade, lumbering, or government service" (Thompson et al. 1996:15). The 1854 Treaty of LaPointe ceded Ojibwe lands located within Minnesota's arrowhead region to the United States. The Ojibwe retained usufructuary rights within the treaty area. The Bois Forte Band retained the right to choose their reservation location near Lake Vermilion. In 1855 another treaty was signed, ceding Ojibwe land west of the 1854 Ceded Territory to the United States. Nine reservations were created, including Grand Portage and Fond du Lac (Figure 11). The Treaty of 1866 removed the Bois Forte to Nett Lake. The Dawes Act of 1887 (the General Allotment Act) authorized the federal government to survey Indian lands, divide them into small tracts, and assign ownership of the pieces to individual American Indians. Land occupied by Indians was "broken up and parceled out, with the vast

remaining amounts of land sold to non-Indian people" (Graubard and Archabal 2001:122). The Act resulted in an attempt to locate all of the Minnesota Ojibwe bands at the White Earth Reservation. (The Indian Reorganization Act [IRA] of 1934 opened the door to stronger tribal sovereignty for the Minnesota Ojibwe, "as reservation governments organized and displaced the Bureau of Indian Affairs, which had managed the day-to-day affairs on reservations" [D. Treuer 2001:8]).

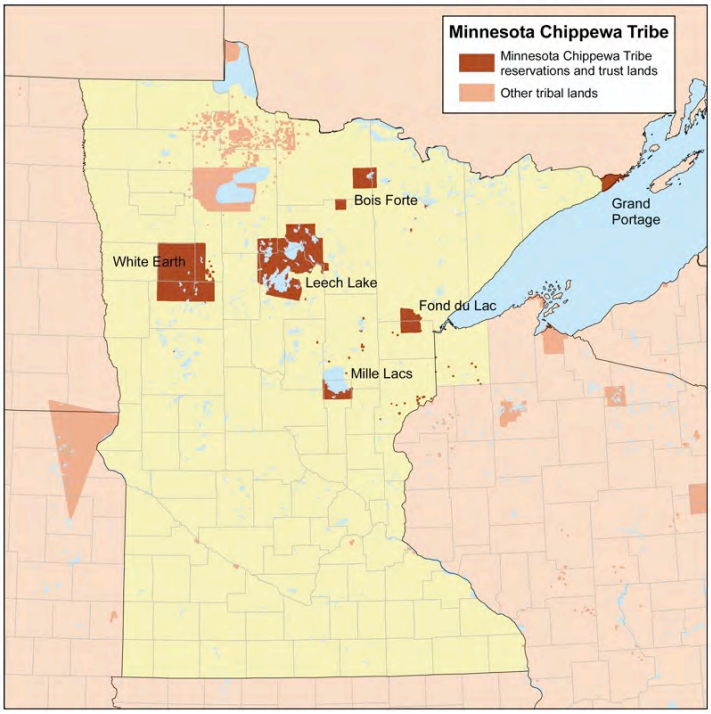

Figure 11. Minnesota Chippewa Tribe Reservations, Trust and other lands. (MNDNR)

Geological Exploration

The territorial survey of the area for timber and minerals across Minnesota Territory followed the Chippewa Treaties of 1854 and 1855 and the creation of St. Louis County in 1856. Geological surveys conducted prior to the Chippewa treaties of 1854–55 included those in 1848 and 1850 by Joseph G. Norwood and Charles C. Whittlesey for David Dale Owen. They documented the presence of iron deposits in the Vermilion region; Norwood followed the St. Louis, Embarrass and Pike Rivers to Lake Vermilion where he observed "beautiful crystals of iron pyrites" (Walker 1979:17). When the statewide geological and natural history survey led by N. H. Winchell (1839–1914) investigated northern St. Louis County in 1872 and during the next two decades, the potential mining resources were extensively mapped, but observations of the Indian landscape, particularly along the Giant's Range, and the Pre-Contact Period landscape were also recorded (Figure 12). Winchell describes the height of the range across T59N, R14W and in T60N, R14W as reaching 1,865 feet in Section 12. He noted that the range began to "sink away" in Sections 12, 13, and 14, and was "wholly lost, as a hill range," in T60N, R12W (Winchell 1899:224-225). Winchell reported that when he visited the Vermilion Lake area (north of the current study area) in 1878, no land survey had been attempted. His guide at Sucker Point was Bashitanequeb, who "afterwards became one of the most useful guides to the later parties of the survey" (Winchell 1899:522). Winchell's plates of the Partridge and Dunka rivers (ca. 1896–1898; Figure 12) show railroads and wagon roads in addition to geology, but do not show the Indian trails that were

already published on GLO township maps. These features, however, were also omitted by Leith (1909) and later geologists who mapped the natural ore mines that were developed across the study area by 1920.

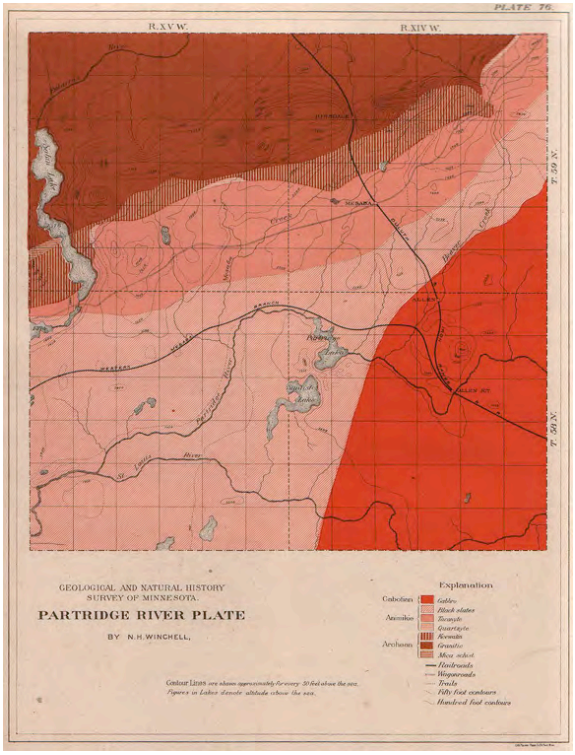

Figure 12. N. H. Winchell, Partridge River Plate No. 76, ca. 1896-1898. *Geological and Natural History Survey of Minnesota*, 1899.

As noted below, late-19th-century geological exploration by Newton H. and Alexander Winchell and others provided a few eyewitness accounts of Indian trails and portages, and plants such as wild rice.

3.2.8 Food, Medicinal and Sacred Plants

Ethnobotany is the study of the interactions between human cultures and plants and is based on the geographic relationship between the physical environment and local cultural practices. Native American ethnobotanical studies document the exhaustive use of plants for food, medicinal, ceremonial, fiber, dye, and other uses. Ethnobotanical surveys and tribal elder interviews have been incorporated into cultural landscape studies conducted in many parts of the United States (Ruppert 2001).

European explorers initially learned about the Ojibwe use of plants, and missionaries such as Joseph A. Gilfillan and ethnographers such as Frances Densmore were the first to compile detailed records (Gilfillan 1886; Densmore 1928). Surveyor George R. Stuntz (1820–1902) suggested that native people of the Vermilion region "cultivated stands of select plants" and noted planting of oaks, lindens, elms, and plum trees (Stuntz 1884:77;83; Gronhovd 2007:16). Birch and basswood were very important to the Ojibwe, notes the *Aborigines of Minnesota:* "combining these they made not only the covers for their habitation but also numerous articles of usefulness about the cabin, a well as the birch bark canoe, which was the chief instrument of all his success whether in fishing, hunting, trading or war" (N. H. Winchell 1911:588). Among its numerous uses, the bark of the white birch was made into vessels to hold maple sugar and wild rice.

We live with the seasons. The gifts we were given include: wild rice, blueberries, sugaring. All these things are gifts from the Creator. It's something for us to use and not to [use these resources] with respect [would be incorrect]. This is what we've been taught. Some of these traditions are coming back.

Ron "Mootz" Geshick, Bois Forte Band, June 18, 2011 (Walker and Zellie 2011, Appendix Section 6.5.3)

Band elders recalled how their families relied almost entirely on the products of gathering, hunting, trapping and fishing for subsistence. According to Geshick, gardening at Nett Lake was not common because the soils were poor, but milk was obtained from a dairy owned by the Anderson family. In addition to rice, hazelnuts, berries, and maple sugar, roots and mushrooms were collected. Geshick described the mushrooms as cantrells.

Interviews conducted in 2010 and 2011 document the current use of food, medicinal, and sacred plants gathered across the Lake Vermilion area. Bois Forte Band member Marybelle Isham stated, "the area still supports cranberries, blueberries and trees with barks that was (and still is) used for illness" (Latady and Isham 2011:6; Appendix Section 6.5.1).

3.2.8.1 The Map of Landscape and Memory

You pick and you hunt and you harvest where your family did.

Rose Berens, Bois Forte Band, 5/11/11 (Zellie 2011, Appendix Section 6.5.2)

Treaties and other actions forced the Ojibwe onto reservations, but the locales visited by the bands for traditional activities are still mapped by the memories of elders. Many traditional areas continued in use well after the establishment of reservations. Rose Berens noted that an elderly woman from Nett Lake told her about going to the Laurentian Divide—*Missabi Widjiw* —to make maple sugar. Why, she asked, would you go so far—"there are sugarbushes right by your home and you aren't from there!" She replied, "that is where we came from!"

Berens noted, "someone who now lives miles away but would return to an area near the Embarrass River to gather, for example, is tracing the places that their ancestors came. They are thinking, 'I want and I need to pick in that place'" (Zellie 2011, 6.5.2).

3.2.8.2 Offerings

Band elders consistently described the practice of offering tobacco before gathering plants:

Before picking berries for the first time—high-bush cranberries, blueberries, strawberries, raspberries, gooseberries—families offer a small portion of the first pick, mixed with rice. Tobacco is smoked, and prayers are offered. After that, if you went picking blueberries during the season, you offered something, a pinch of tobacco each time.

One of the things we are taught is that we are living in a garden that the Creator has allowed us to live in. This is His; we can't just go and pick whatever we want. Tobacco is a medium for prayer; it allows our prayers to go to the Creator.

Rose Berens, Bois Forte Band, 5/11/11 (Zellie 2011, Appendix Section 6.5.2)

Becky Gawboy, of Tower, observed that "traditional plants grow everywhere, some only in certain soils, and weather conditions, roots, bark, and even flowers are still used medicinally for

illnesses" (Latady and Isham 2011:4, Appendix Section 6.5.1). Band members mentioned specific uses for barks: Elaine Tibbetts noted, "I make 'Swamp Tea' to heal any sickness. 'Cedar Tea' is stronger and has more cleansing [properties]" (Walker and Zellie 2011, 6.5.3).

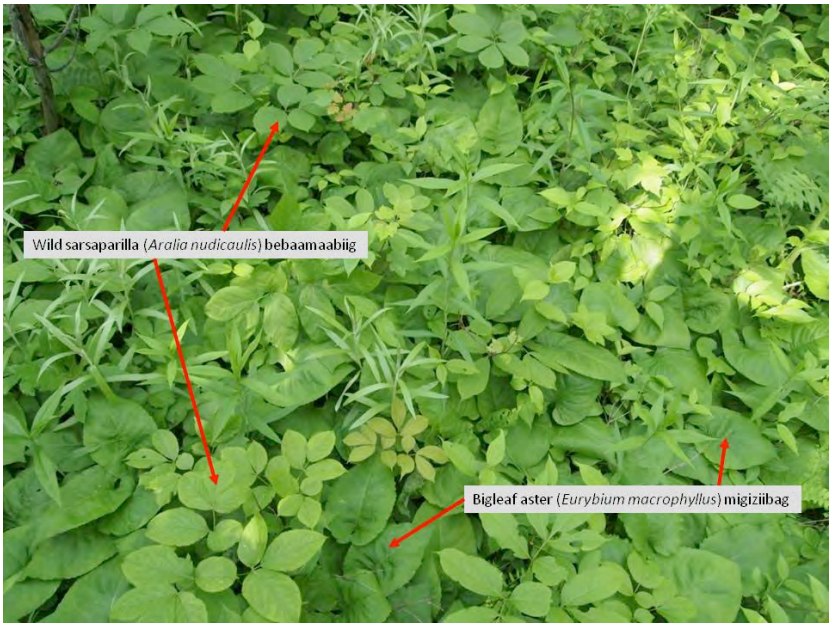

Figure 13. Bigleaf aster "migiziibag" or "namegosibag" and sarsaparilla "bebaamaabiig", "okaaadaak" or "waaboozojiibik" in Survey Area One. GLIFWC plant names; Barr photo.

3.2.8.3 Plant Survey Overview

The purpose of the plant surveys was to evaluate the degree to which the study area provides opportunities to gather a variety of plant species for use in traditional Ojibwe cultural practices (Figure 13). This representative evaluation enables a broader characterization of similar traditional vegetation gathering opportunities within the watershed and in the region.

The study area today is a mosaic of upland and wetland vegetation communities (Maps 6-7). The plant surveys identified more than 152 plant species. Most (80%) of these species are listed in *Plants Used by the Great Lakes Ojibwa* for the Great Lakes Indian Fish and Wildlife Commission (GLIFWC; Meeker et al. 1993), where their Ojibwe names are provided and their traditional uses are described. [Note: Plants not listed in the GLIFWC text may also have traditional uses. Most of the plants identified during the survey that are not listed in GLIFWC are obscure species, such as orchids and spike rushes, or introduced weedy species, such as buckthorn and orange hawkweed.]

Plant survey methods are detailed in Appendix Section 6.1. More than 152 plant species were identified in the 43 vegetation plots surveyed in 2010, in seven distinct Ecological Classification System ("ECS," MNDNR 2003a) community types. The seven ECS community types identified are:

- Fire dependent (FDn)
- Forested Rich Peatland (FPn)
- Acid Peatland (APn)
- Mesic Hardwood (MHn)

- Marsh (MRn)
- Wet Forest (WFn)
- Wet Meadow (WMn)

Five plant species were identified in at least half of the 43 plots, and another 21 plant species were identified in at least one-quarter of the plots. However, nearly three-quarters of the plant species identified occurred in five or fewer plots. Also, most plant species identified were present in relatively low percent cover (<5%), regardless of the number of plots in which they were found.

Plant species that are found in multiple plant community types are more broadly available to gatherers of plants. Conversely, collection of a plant species that is found in only one community type would require a specific trip to that vegetation community in order to gather the plant. Three plant species were found in five of the seven ECS community types. Eleven species were found in four of the seven community types, and twelve species were found in three of the community types. The 26 plant species that were found in at least three ECS vegetation community types are listed in Table 4. Table 9 in Appendix Section 6.1 lists all of the species that were found in the 43 plots, as well as the ECS communities they were documented in.

Table 4. Plant Species Found in at Least Three ECS Vegetation Community Types

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Abies balsamifera	Balsam fir	•	•	•	•	•		
Alnus incana	Speckled alder	•	•	•	•		•	
Vaccinium angustifolium	Low-bush blueberry	•	•	•	•	•		
Athyrium filix-femina	Lady fern	•	•		•	•		
Betula papyrifera	Paper birch	•		•	•	•		
Gaultheria hispidula	Creeping snowberry	•		•	•	•		
Larix laricina	Tamarack	•		•	•	•		
Ledum groenlandicum	Labrador tea	•		•	•	•		
Picea mariana	Black spruce	•		•	•	•		
Calamagrostis canadensis	Blue-joint grass	•		•			•	•
Coptis trifolia	Gold-thread	•		•	•	•		
Cornus canadensis	Bunchberry dogwood	•		•	•	•		
Corylus cornuta	Beaked hazelnut	•	•	•	•			
Rubus idaeus	Wild red raspberry	•	•	•	•			
Thuja occidentalis	Northern white-cedar		•	•	•			
Linnea borealis	Twinflower	•		•	•			
Acer rubrum	Red maple	•	•		•			
Acer spicatum	Mountain maple	•	•		•			
Amelanchier sanguinea	Serviceberry	•	•		•			
Aralia nudicaulis	Wild sarsaparilla	•	•		•			
Clintonia borealis	Blue-bead lily	•	•		•			
Eurybia macrophyllus	Bigleaf aster	•	•		•			

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Galium trifidum	Three-lobed bedstraw	•	•		•			
Maianthemum canadense	Canada mayflower	•	•		•			
Populus tremuloides	Quaking aspen	•	•		•			
Streptopus roseus	Rosy twisted-stalk	•	•		•			

The plot data therefore portray the study area as having high plant diversity, with a broad selection of plant species available to Native Americans gathering plants in the area. With the exception of the Sugar Maple site, there appears to be no strong correlation between plant communities and other landscape features in the study area. Extrapolating the study area to the APE, there is no significant difference in vegetation communities between the Survey Areas and the APE. Therefore, one would expect to find at least the same 152 plant species associated with the appropriate vegetation communities in the APE as are found in the Survey Areas.

See Section 3.2.10.1 for plant survey results at the Spring Mine Lake Sugarbush; Section 3.2.11.2 for results at the Overlook; Section 3.2.12.5 for trail results, and 3.2.18.1 for logging results. See also Appendix sections 6.1-6.3.

3.2.9 Wild Rice

Figure 14. Wild rice harvest: group pounding parched rice to loosen the hulls prior to winnowing; location unknown. Frances Densmore, photographer, ca. 1910.

"It has always been a part of my life."

Wild rice is just something that was always there; you are fed it as a baby as one of your first foods; it is used not only as a food but as a medicine. Women want children to eat wild rice. The rice harvest is an important part of ceremonies and celebration.

"It reminded them who they were."

When I was growing up in Nett Lake, every fall the village would be filled with people I had not seen all year from as far away as California and Oregon. They traveled to Nett Lake to pick rice to eat and sell, but also to celebrate their connection with it and with their relatives. They might stay for a month and live in a different world. Then they could look back on the fall, what they had done, and the memory would carry them the rest of the year.

Rose Berens, Bois Forte Band, 5/11/11 (Zellie 2011, Appendix Section 6.5.1)

Archaeological evidence and oral tradition suggest that wild rice has been a subsistence staple for native peoples since the Late Woodland period in northern Minnesota and northern Wisconsin. The *manomin* (*Zizania palustris*) played, and continues to play, a "central role in tribal life:"

> It was endowed with spiritual attributes, and its discovery was recounted in legends. It was used ceremonially as well as for food, and its harvest promoted social interaction in late summer each year (Vennum 1988:1).

An annual plant with seeds that require a muddy alluvial bottom for anchorage, wild rice grows best in alkaline, carbonate waters with gentle but steady water movement produced by slow flow through lakes and meandering backwater stream channels where alluvial deposition is occurring (Moffat and Arzigian 2000; Vennum 1988:30). Slowly moving streams are more conducive to wild rice, while the deeper channels and swifter currents of major rivers are not (Vennum 1988:31).

Figure 15. Wild rice harvest at Nett Lake, 1946 (Monroe P. Killy, photographer)

Following migration from the mouth of the St. Lawrence River during the mid-17th century, small dispersed bands of Ojibwe lived at the east end of Lake Superior in an area outside the natural range of wild rice. During migration along both shores of Lake Superior they acted as guides, interpreters, and trading partners with the French and moved into northern Minnesota and Wisconsin's wild rice habitat. Further geographic dispersal required adaptation to the areas occupied:

> Those in the boreal forests north of Lake Superior were hunters and trappers; those in the coniferous-deciduous forests along the southern and western edges of the lake depended

> to a greater extent on fishing; those farther inland, principally the southwestern Ojibway, were wild rice gatherers (Vennum 1988:2).

With the potential for wild rice in the shallow margins of lakes and streams, and abundant wild plant, fishing and hunting habitats, the APE landscape was very attractive to the Ojibwe:

> Wild rice was their staple, accompanying all other foods they ate. In lean times it was often the only item they had. Wild rice was also one resource that induced the Ojibway to move west and south of Lake Superior; the rice lakes were areas they were willing to fight to retain (Vennum 1988:3, 5).

The Ojibwe organized their economy around wild rice and the seasonal cycle of fishing, sugaring, trapping, and hunting (Figure 15). Maple sugar was harvested in the spring and rice in the fall. Each "group of relatives had its share of the rice field as it had its share of the sugar bush, and this right was never disputed" (Densmore 1929:128). Harvested by canoe, rice ripens over a 10- to 14-day period in late August to early September, requiring regular visits for harvesting unless groups of stalks are bundled together to promote more uniform ripening (Moffat and Arzigian 2000). Ojibwe reliance on wild rice as a staple varied with the availability of these resources and on cycles of abundance (Vennum 1988:42-45). A hand-harvested rice stand could produce approximately 100 pounds per acre, and "it was possible for a woman to harvest several hundred pounds of rice a day" (Vennum 1988:107). Parching and hulling preceded storage (Figure 14). Because of its longevity as a staple, with a shelf life of up to ten years, it was the most important grain available to native peoples as well as early explorers and fur traders.

The continuing role of wild rice in Ojibwe religion, culture, livelihood and identity is evident in the annual harvest that involves thousands of tribal members and totals more than 2 million pounds per year (MNDNR 2008:1). In 2011, several Band elders mentioned how rice can be used as an offering, and how tobacco is offered before each ricing trip (Walker and Zellie 2011, 6.5.3).

Bois Forte Band elder Ron "Mootz" Geshick recalled,

[When I was growing up], there was one road into and out of Nett Lake [Reservation]. We riced Nett Lake, Vermilion River, and Big Rice Lake. Rice was pretty easy to get. It was easy to harvest, finish, it kept a long time. As long as you keep it cool, it can keep for years. In Mountain Iron, I have a friend who lost her son about [35] years ago. She still has the rice he harvested [as a way to remember him]. That rice is still good. [When I was growing up], men riced together and women riced together. We never bought rice, and sometimes sold it for our school-clothes budget (Walker and Zellie 2011, Appendix Section 6.5.3).

Bois Forte Band elder Henry (Hank) Goodsky recalled,

[As a child], I started finishing rice near the dam, then parching rice. I was 13 years old. I learned the importance of earning money. Ricing was a blessing to us. We earned money from it for school clothes. We bought a car. We learned to take what we needed. We share wild rice amongst our family. My brother harvests it and my sister cooks it (Walker and Zellie 2011, 6.5.3).

3.2.9.1 Overview of Wild Rice Surveys in Survey Areas One and Two

At the request of the Minnesota Pollution Control Agency (MPCA), natural stand wild rice surveys, water quality analyses, plant growth parameter analysis, and some sediment analyses

have been conducted in waters supporting wild rice. Barr has carried out these studies for numerous mining companies for two years and work is ongoing in approximately 20 water bodies and several large and small river systems in northeastern Minnesota. Stands of wild rice were identified during the surveys within Survey Areas One and Two. The larger stands of wild rice on the Embarrass River are found outside of Survey Area Two, below Embarrass Lake (Map 16). Study methods are summarized in 6.3.

3.2.10 Maple Sugar

Figure 16. "Boiling maple sugar on an Indian reservation," ca. 1890–99.

When I was a little girl, sugaring was strong. We made syrup, cakes, sugar and powdered sugar [from syrup]. It is coming back again today. More people are sugaring.

Elaine Tibbetts, June 19, 2011 (Walker and Zellie 2011, 6.5.3)

Bois Forte Band elders reiterated the importance of maple sugar as a gift from the Creator, as food, and as an offering (Ron Geshick, June 18, 2011; Elaine Tibbetts, June 19, 2011; Walker and Zellie 2011, 6.5.3). Despite significant decline in the number of producers and increased mechanization, maple sugar continues to be made for home and family consumption by Ojibwe across the Western Great Lakes region. The sugarbush "continues to serve as an important symbolic element in the development and maintenance of an Indian identity, solidifying the relationships of individuals and communities in the present with their land and their ancestors" (Thomas 2004:*ii*).

Late March and early April in northern Minnesota is known as *Izhkigamisegi Geezis*, the Moon (month) of boiling. Maple sugaring took place at family "sugar bush" locations (sugar maple, *Acer sacharum*). The sugar, in granular form or syrup, provided seasoning for grains and breads, stews, teas, berries, and vegetables. During the 1920s Frances Densmore recorded the sugaring

stories of Mille Lacs Band Ojibwe. Nodinens (Little Wind), described her childhood during a late winter hunting camp that ended with tapping a grove of sugar maples. The enterprise was led by women; her mother's brass kettles were obtained from an English trader and tin pails from an American trader. The boiling kettles and sugaring equipment were cached under birch bark and left in the sugarbush after the end of the season (Densmore 1929:120-23; Figure 16).

It takes about 30 to 40 gallons of maple sap to make one gallon of syrup, and the operations were extensive: in the case of Nodinens, six families tapped about 2,000 trees. Two to ten tappings could be made in each tree. Thick syrup for hard sugar *(zhiiwaagamizigan)* was scooped before it granulated from the final boiling kettle, and poured onto ice or snow to solidify. It was poured into molds or packed tightly into shells or birchbark cones *(zhiishiigwaansag)* whose tops were sewn shut with basswood fiber for storage. When the boiled sugar was about to granulate in its final boil-down, it was poured into a wooden sugaring trough, made from a smoothed-out log. It was stirred there to granulate it, and rubbed with ladles and hands into sugar grains, *ziinzibaakwad.* Warm sugar was poured from the trough into birchbark makuks. This form was used for seasoning and stirred into teas (GLIFWC 2006). Maple sugar was also among goods traded to lumber camps, early Euro-American farmers, and other markets (McClurken 2000:16).

In a description of 19th-century sugaring at Grand Portage, Thomas (2004:90) refers to N. H. Winchell's 1911 account of the sugaring process published in the *Aborigines of Minnesota* (Winchell 1911). Winchell described the Speckled Trout Lake sugarbush as "celebrated," and various other records note additional sugaring camps along a Grand Portage sugarbush trail (Thomas 2004:90). Some families produced large volumes of sugar, and families moved into the sugarbush for two or three weeks. The sugar and candy lasted throughout the year. Through the first half of the 20th century, the Grand Portage Ojibwe "continued to tap trees with an axe and use a wooden flat tap, collecting the sap in birch bark containers set at the base of the tree" (Thomas 2004:90). This corresponds to the containers and paddles found at the Spring Mine Lake sugarbush in 1969 (Loftus 1977:73; Section 6.9). Commercial production began in the 1950s, which included operation of a processing plant on the Grand Portage Reservation between ca. 1957 and 1972 (Thomas 2004:91;96).

3.2.10.1 Spring Mine Lake Sugarbush

Stands of sugar maple occur sporadically across the APE. The only documented stand of sugar maple in Survey Areas One or Two is southwest of Spring Mine Lake in the NW 1/4 of Section 11, T59N, R14W, which appears to be a natural maple-basswood stand that has been managed to increase sugar maple coverage and to exclude non-maple tree species (Figures 17-21). Occasional individuals and small groups of sugar maple were also found on the upper slopes of the overlook. However, sugar maple has not been documented elsewhere within the Survey Areas, including on the NorthMet Mine Site.

The Spring Mine Lake maple sugar site ("sugarbush" and "sugar camp") is located south of the intersection of what Trygg labeled the "Vermilion to Beaver Bay Trail" and east of the "New Indian Trail" (1966:17; Map 18). The New Indian Trail was also labeled by GLO surveyors. The study team, including Consulting Band members, made several visits to this site in 2010-2012 (Figure 17). Most of the site is north of a former power line corridor that appears as a vegetated, V-shaped linear feature on aerial photographs. A recent firebreak had been bulldozed through a portion of the sugar bush from the former power line corridor north. The break appears to have followed an existing road. The age, use, origin, and extent of this road is not known at this time.

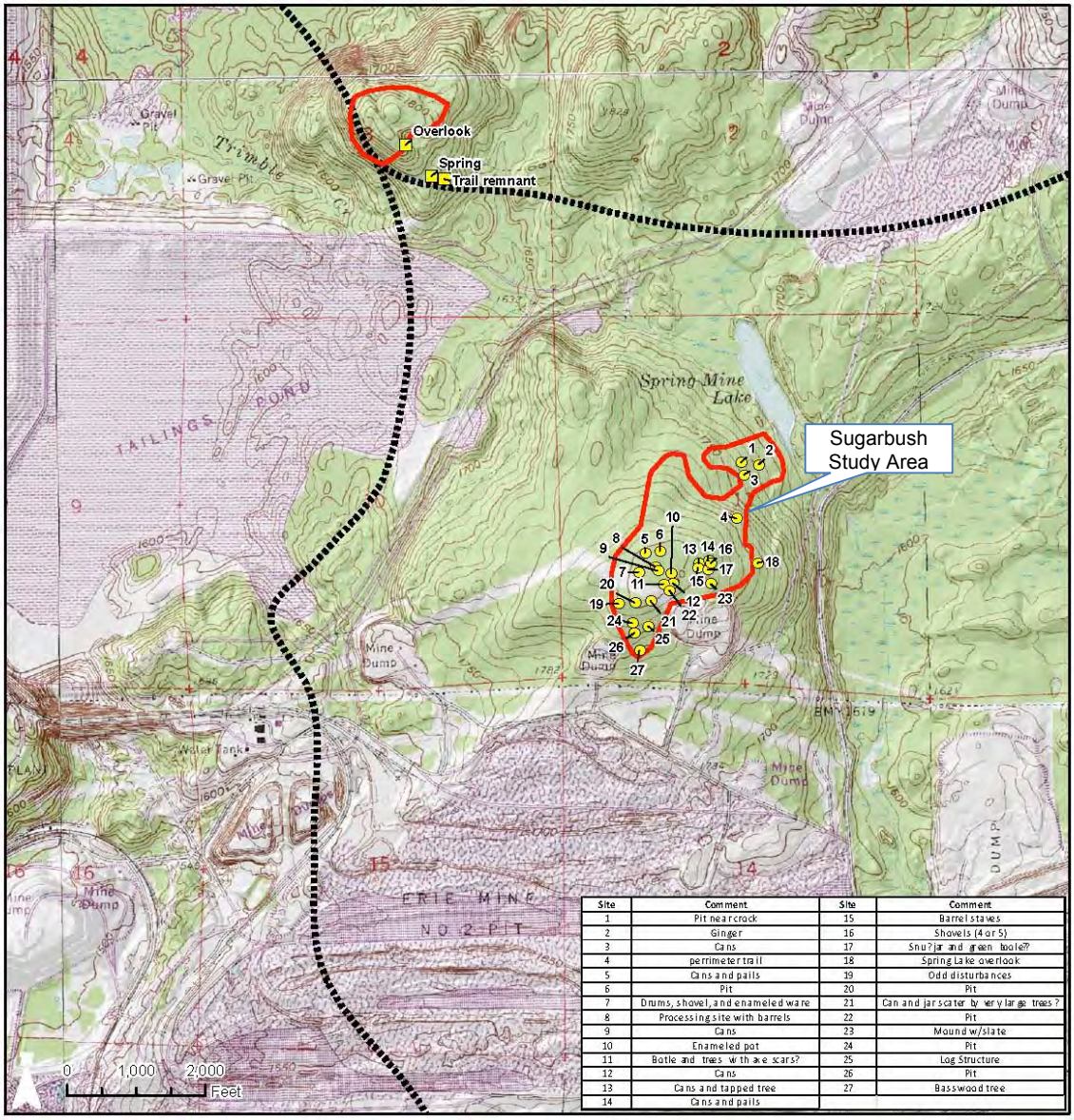

Figure 17. Spring Mine Lake Sugarbush Study Area, 2010-2012 (bottom red outline), Section 11, T59N, R14W. Corps.

3.2.10.2 Archaeological Fieldwork

In 1969 Michael Loftus of Beloit College in Beloit, Wisconsin examined this sugarbush. Loftus was directed to the location by Erie Mining Company staff. His report, published eight years later, refers to government surveyors' notes from 1858 and 1882 that mention the maple sugar camps. However, he cites only the Trygg map (1966), possibly referring to Trygg's map notations (Loftus 1977:71 Appendix Section 6.9). Loftus spoke with local informants who suggested that previous Ojibwe "movement to the grove was from the Embarrass and Wine Lakes west of the grove, and from the Embarrass River to the north" (Loftus 1977:73).

Loftus described the site as a "Late Historic Period Chippewa Sugar Maple Camp," and noted

that the trees within the grove were between 100 and 200 years old (Loftus 1977:73). He reported on a structure at the interior of the grove that was constructed of pine logs secured with round iron nails. The 6 x 8-foot structure measured 4-1/2 feet high at the roof peak. A small collapsed lean-to was also observed. Stockpiled birchbark baskets and basswood wedges or paddles were interspersed with metal pots and pans within the structure, and "various other containers" (Loftus 1977:73). Loftus observed approximately 50 birchbark baskets: "the floor of the hut was literally covered with such baskets" (Loftus 1977:73). A description of the baskets and paddles is included in his report (Section 6.9). Loftus concluded that the site was significant because it allowed "for a comparison of Late Historic Chippewa sugaring practices with those of the Early Historic Period." He concluded that it "would appear that some of the materials used in the sugar maple camps had changed relatively little over time" (Loftus 1977:74).

Figure 18. Spring Mine Lake Sugarbush in Section 11 of T59 N, R14W showing dominance of sugar maple, 6/10/10. Barr photo.

Figure 19. Log structure ruin (arrow) at Spring Mine Lake Sugarbush in Section 11 of T59N, R 14W, 10/13/10, Barr photo.

Figure 20. Ruin of log structure at Spring Mine Lake Sugarbush, 6/9/2010. Corps photo.

(Note: see Appendix Section 6.10.1 for additional maps accompanying the following fieldwork report adapted from B. Johnson 2012.)

The first recent visit, on June 9, 2010, included Band members, THPO staff, Corps archaeologist Bradley Johnson, and consultants (Figure 17). The remains of the log structure identified by Loftus, now only a few logs high, showed only one nail. A scatter of pails and buckets were observed; they appear to date no earlier than the 1920s because of their crimped rather than soldered seams. Stones had been placed at the entrance, but there were no other associated

features such as fire hearths or structures.

A second processing location visited that day was north of the former power line corridor. Another more recent structure with a corrugated sheet metal roof was observed. An adjacent fire pit was brick. The structure was nearly collapsed. The area had a large scatter of old soda cans and several Office of Civil Defense, Department of Defense Drinking Water (17.5-gallon) barrels, dating the site to around the 1960s. According to PolyMet staff, this processing site was associated with a forester who used the area in the 1970s.

Based on observations from this visit, the sugarbush appears to be a large multi-component site with evidence of maple sugaring activity from a range of time periods. No trails, other than the older road that the firebreak followed, or other processing/sugar camp areas were noted during this visit (B. Johnson 2012).

A second visit on July 13th, 2010 by Johnson and Barr consultants confirmed that there was no sugaring activity south of the log structure. On July 14th, reconnaissance around the perimeter of the site attempted to identify trails leading to the sugar bush. On the east edge of the sugar bush was a large cut-over area with a view of Spring Mine Lake. No obvious trails were observed other than the possible road/fire break as noted in the previous visit (B. Johnson 2012).

On August 24th, 2010, Johnson returned to the site with Bill Latady from Bois Forte, two independent historians from Two Harbors, Todd Lindahl and Don Manuey, consulting botanist Deb Pomeroy, and Bob Swanson from Grand Portage Band.

During this visit several different activity areas were identified. Some of the artifacts observed during the surface reconnaissance of the site indicated use of the site at or about 1900 (Figure 17). At one location broken window glass was present, suggesting that a structure may have been present at one time. Nearby in the roots of a large maple tree there was an artifact scatter consisting of tobacco cans, shoe remains, and bottles. Numerous metal barrel staves and a set of nested shovels were also in this activity area. One low-profile surface feature of unknown function was also observed adjacent to this area. Pomeroy collected vegetation information at this location, and recorded the location of wild ginger (B. Johnson 2012).

Bois Forte Band elder interviews confirmed the location of this camp. A small photograph in the possession of an elder shows three people in a hardwood forest and is labeled:

> "The individuals are standing in front of an arbor and holding items associated with making maple sugar. The caption on the reverse, printed in block letters with a pencil reads MA & PA & ME SUGAR MAKING IN SPRING MINE MESABA, MINN, 1942" (Latady and Isham 2011:4, Appendix Section 6.5.1).

3.2.10.3 Plant Survey at the Spring Mine Lake Sugarbush

The sugar maple collection site in Section 11 of T59N, R14W is a mesic-hardwood community type. Specifically, it is a rich maple-basswood forested community with a relatively open understory and diverse herbaceous groundcover. Review of forestry data compiled by MNDNR suggests that vegetation in the sugarbush has been artificially manipulated, most likely by Native Americans. Sugar maple (*Acer saccharum*) abundance in the sugarbush site is much higher than what would typically be found in maple-basswood communities in the region. The sugarbush site

is strongly dominated by sugar maple, with the usual associated tree species basswood and birch almost entirely missing.

The strong dominance of sugar maple at this site, along with the near-absence of basswood and birch, suggests that the distribution and abundance of canopy tree species has been managed to select for maple and against non-maple tree species. This is consistent with the past use of the area. Managing the sugarbush site for maple syrup production would result in the species composition and abundance that is currently present, since non-maple species would obviously not contribute to syrup production and would likely be removed to create space for additional sugar maple trees.

Moreover, many of the sugar maples at the sugarbush have misshapen boles, with flattening and widening of the bole between approximately four to eight feet from the ground. The centers of these flattened bole sections are depressed and cracked. Many show interior decay, and several trees have snapped and fallen at the point of decay. This anomaly in a stand of sugar maple is the result of prolonged repeated tapping of the tree for syrup, with the entry point of the tap creating a structural weakness in the tree trunk and providing an avenue for secondary infection.
See Section 4.0 and Appendix Section 6.10.1 for further evaluation of this property.

Figure 21. Misshapen bole, Spring Mine Lake Sugarbush, 6/9/2010. Corps photo.

3.2.11 *Missabe Widjiw* (Laurentian Divide) and Promontories, Overlooks, and Outcrops

> *Mesabi means giant. [There is a story] that a giant appeared [in some location on/near] the Laurentian Divide. We leave tobacco at a location along the Laurentian Divide [which is considered sacred, a rocky outcrop].*
>
> Ron "Mootz" Geshick, Bois Forte Band, June 18, 2011 (Walker and Zellie 2011, Appendix Section 6.5.3)

As noted in 3.2.1, 3.2.11 and in Band elder interviews cited throughout this report, the Laurentian Divide–*Missabe Widjiw*–is regarded as a sacred place (Figures 5, 8). This feature occupies the

crest of a line of low, rugged, Precambrian rock hills also known as the Giant's Ridge where the divide separates the waters flowing north to the Arctic Ocean and south to the Atlantic Ocean. Within Survey Area One and Two, the south slope of the Divide is broken by rock outcrops and ledges on elevations that provide views over the surrounding forest and wetlands. During the late 19th century, government land surveyors in the area recorded some of the "granite ledges" they encountered, and some mapmakers also sketched their location on township maps.

A granite-capped promontory in the NW 1/4 of the NE 1/4 of Section 3 of T59N, R14W is a notable feature within Survey Area One (cover, Figures 22-25). Situated on the south slope of the Divide, it is framed by other granite ledges north of the intersection of two trails identified by government surveyors and Trygg (1966:17; Map 18). Bois Forte Band member Rose Berens visited the site on June 10, 2010. She later described this and other similar features as "someplace to make us stop and spend some time" (Zellie 2011, 6.5.2).

Rose noted that rock outcrops are "high power" areas, especially east-facing. This east-facing outcrop is not common and this type of area "could not go unnoticed; it would be used for spiritual purposes. It would be a spot to go for special occasions or ceremonies." Such a spot, so near trails, would have been used. She noted,

> *Visiting such a spot I would find a little protruding rock and leave some tobacco; instantly I would imagine people sitting there, using it for a vision quest. Fathers might take their sons to such a place to fast."*
>
> Rose Berens, Bois Forte Band, May 11, 2011 (Zellie 2011, Appendix Section 6.5.2)

Figure 22. Looking east at the overlook (center) in Section 3, T59N, R14W, 9/9/2010. Barr photo.

3.2.11.1 Archaeological Reconnaissance at the Promonotory Site (Overlook)

(Note: see Appendix Section 6.10.3 for additional maps accompanying the following fieldwork report adapted from B. Johnson 2012.)

Corps archaeologist Bradley Johnson and Claire Whitmore from the Corps, Rick Guitar from the Fond du Lac Band, Nick Axtell from the 1854 Treaty Authority, Rose Berens and Bill Latady from the Bois Forte Tribal Historic Preservation Office, independent botantist Deb Pomeroy and consultants visited the overlook site on June 10, 2010, while investigating the intersection of the New Indian and Lake Vermilion-to-Beaver Bay trails east of the former Erie Mining Company/LTV tailings basin. The trail intersection in the NW 1/4 of the NE 1/4 of Section 3 of T59N, R14W appears to have been on, or near, a prominent landform in the Embarrass Mountains, which lies on the south slope of *Missabe Widjiw* (Laurentian Divide). Adjacent to this landform, as shown on the 1949 Aurora U.S.G.S. Quadrangle, there appears to be a natural corridor through the Embarrass Mountains that follows a small stream.

The reconnaissance began at a point on the southeast side of the landform and adjacent to a portion of the existing tailings basin and followed the approximate path of the trail corridor. The route was determined from GLO surveys and the Trygg map (1966:17). A number of game trails were observed and also one possible trail remnant. The remnant was located approximately mid-way up the first part of the first slope. Deeply worn into the ground's surface, this feature was not connected to the game trails and appeared to simply be a remnant of a much older trail.

Approaching the summit, a number of potentially important natural features, including a spring, were encountered. The spring was located in a swale-like feature perched on the larger landform. Pomeroy collected vegetation information at this location.

A granite bedrock outcrop providing an east-facing overlook crowned the summit. Generally, oak and maple trees occurred in a matrix of aspen, birch, pine, and spruce. The density of hazel and juneberry shrubs made further reconnaissance difficult. Transects across the summit adjacent to the overlook failed to reveal any surface features. A small structure constructed of wood pallets was observed at the summit.

The presence of oak trees, the overlook, and the approximate location of the trail junction indicates this area is culturally significant. As noted in Section 3.2.11, Rose Berens explained the importance of oak in Ojibwe tradition and the significance of the east-facing overlook. Places where oak trees grow are considered to be places where people camped or traveled. Acorns were at times carried on journeys and planted at such locations. This traditional practice is known through Ojibway oral history. Rock outcrops with an eastern view of the rising sun, such as the one on this summit, are places sought by Ojibwe for spiritual reasons, and *Missabe Widjiw* is also a place of known significance in traditional practice and oral history.

As part of the Laurentian Divide viewshed, this outlook provides a sense of prominence and importance. Topographically, it is located in a portion of the divide that appears to present fewer obstacles to overland travel and has some proximity to the Embarrass River. (The Height of Land Portage in Section 18 of T59N, R15W is NRHP-listed). Overall, the area exhibits variable disturbance from logging activity, but may have archaeological potential in addition to being a culturally significant property to the Ojibwe (B. Johnson 2012).

3.2.11.2 Plant Survey at the Promontory Site (Overlook)

This promontory along the eastern edge of the tailings basin ("the overlook") is dominated by regenerating birch and aspen on the lower slopes. However, the mid- to upper slopes are more diverse, with occasional mature remnant red and white pines, small maple stands, and occasional red and pin oak stands. The Global Positioning System (GPS) locations of the remnant pines and maple and oak stands encountered by Barr staff appear to correlate to the trail shown on the

Trygg Map (Map 9).

As described in 3.2.11.1, a rock outcrop approximately 40 by 25 feet in size was found near the point where the Trygg Map indicates an intersection of trails (Figure 23, Map 9). As Barr staff continued west and north along a side traverse of the upper slope, the locations of rock outcrops also correlated closely with the trail route shown on the Trygg Map. The sequence of rock outcrops encountered along the trail route provides a series of west- and south-facing perspectives as one traveled south around to the south slope of the overlook. Continuing up to the top of the overlook, there is a broad bare rock area with views to the east (Figures 24-25).

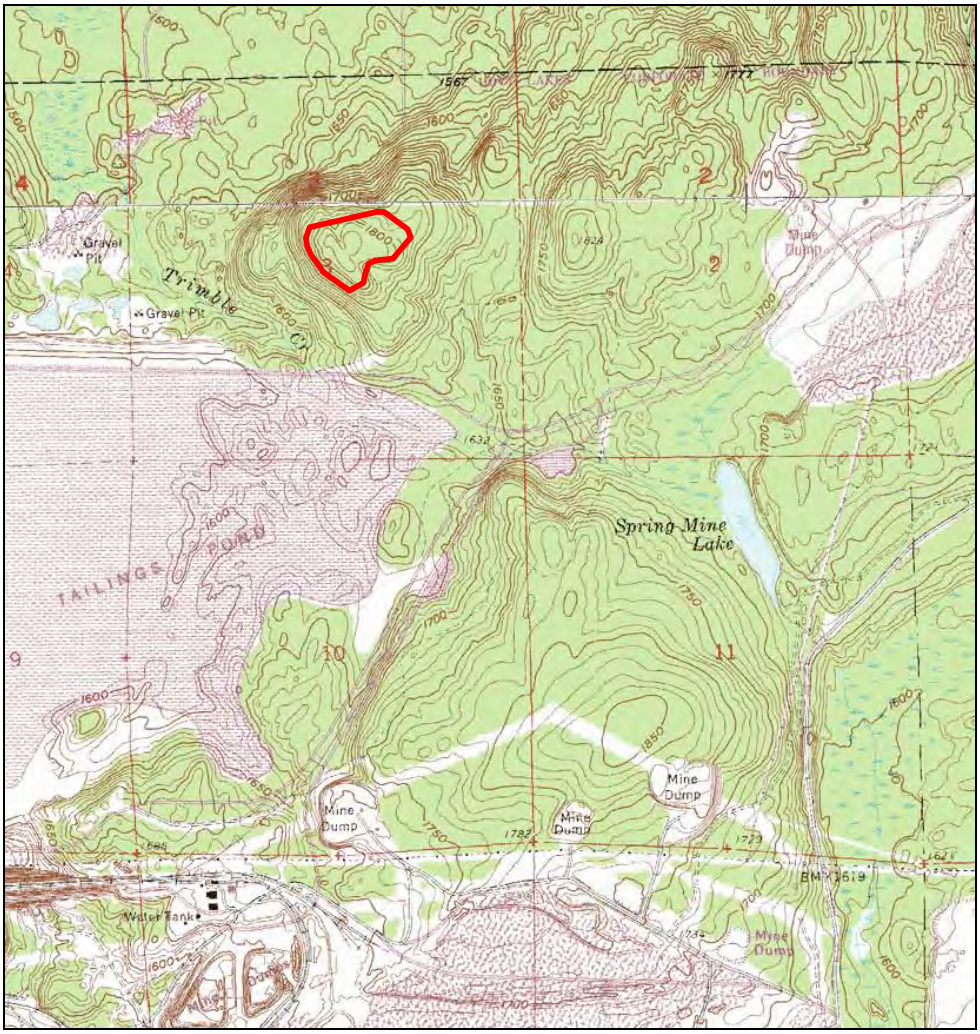

Figure 23. Overlook (red outline), Section 3 of T59N, R14W. Barr.

Figure 24. Outcrop at overlook in Section 3 of T59N, R14W, looking north, 6/9/2010. Landscape Research LLC photo.

Figure 25. Vista from overlook in Section 3 of T59N, R14W, looking east, 6/9/2010. Red or pin oak in center foreground. Landscape Research LLC photo.

Vegetation on the upper slopes and top of the overlook is primarily similar to the fire-dependent vegetation communities found throughout the study area, with a few notable exceptions:

- There are at least two small stands of red and/or pin oak (*Quercus rubra, Q, ellipsoidalis*) near the top and along the trail delineated by the series of rock outcrops. These are the only two plots where oak of any species was identified during the 2010 survey.
- Moreover, past vegetation surveys on the NorthMet site have never documented oak

individuals or stands anywhere on the site.

- Small groups and individuals of sugar maple were also seen during the side traverse of the overlook. Again, sugar maple is uncommon on the NorthMet site. The sugar maple plots documented at the sugarbush site are the only extensive sugar maple areas of which Barr biological staff are aware at NorthMet.
- There are occasional scattered large remnant white pines near the top of the overlook and along the upper slopes. White pine is uncommon at the NorthMet site in modern times, and the white pine that is present is generally not as mature as the pines on the overlook.

These exceptional occurrences of sugar maple and oak may be natural, or they may be the result of Native American utilization of the overlook and the trails passing across its upper slopes. As noted by Rose Berens (3.2.11), the overlook would be an important waypoint to stop and spend time. There is no irrefutable evidence that the oak and maple are the progeny of trees intentionally planted by travelers along the overlook trails. However, the apparent absence of these species in most of the rest of the study area, along with the potential for traditional use, offer compelling circumstantial evidence that the oak and maple on the overlook are the legacy of past Native American use.

The large remnant pines may be matured trees that were too young and/or too difficult to access by logging. No age data were collected. Obtaining cores from several of these trees might provide additional information about their presence on the overlook. (See Section 6.1.3.2 for vegetation methods. and 6.2.3 for detailed results.)

See Sections 4.0 and 6.10.1 for further evaluation of this property.

3.2.12 Indian Trails

Although barely discernable to some observers, the Lake Vermilion-to-Beaver Bay, Birch Lake-to-Beaver Bay, "New Indian," and other trails that cross the survey area and follow the Laurentian Divide–Missabe Widjiw–are vivid to Ojibwe Band members. Rose Berens, for example, stated of the Lake Vermilion-to-Beaver Bay Trail,

> *If there was no mine at PolyMet we would probably not be using the trail like 200 years ago, but I am certain it would be still walked at least once a year from Bois Forte to Grand Portage because it is our connection to relatives in Grand Portage. Because of modern times it would be a spiritual journey, not about transportation. Somebody from Grand Portage would say,"its time we walked that trail—I'll meet you in the middle." It wouldn't be used for travel, but would be walked to keep the trail alive.*
>
> *We pounded it into the earth and it is to us alive. It contains spirituality and memory of long ago that some of us have. Trails are a deep intricate part of nature and culture. If the mines were not there it would be used in a ceremonial way.*
>
> Rose Berens, Bois Forte Band, 5/1l/11 (Zellie 2011, Appendix Section 6.5.2)

GLO surveyor's field books (1872-1882), township maps, and the Trygg Map (1966:17) show a network of trails used by native peoples that cross the APE and Survey Areas One and Two (Maps 8-9, 17-18). Although typically not easily discernable and especially when amidst thick brush or in wet, low-lying areas, such trails between Lake Superior and Lake Vermilion were linked to seasonal camps elsewhere across the Lake Superior region. In 1966, with information from GLO field books and the survey township maps as well as other unknown sources, J. W.

Trygg labeled two prominent trails as the “Indian Trail from Lake Vermilion to Beaver Bay,” and the “New Indian Trail.” Northwest of the intersection of the trails in sections 33 and 34 of T60N, R14W Trygg noted, “remains of an Indian encampment.” Another trail delineated by Trygg, across T60N, R12W, linked Birch Lake to Beaver Bay (Map 9).

The importance of the Laurentian Divide was described by Bois Forte elder Jim Gawboy. In an interview with Marybelle Isham he noted, “the Thunderbird Trail is hard to describe, it is a spiritual path which the Thunderbird uses, and only those who really want to see the Thunderbird regard it as a sacred place, and a place to leave offerings, and tobacco” (Latady and Isham 2011:3, 6.5.1). Becky Gawboy stated that her knowledge of the trail “was taught to her by elders from Grand Portage and Nett Lake. The story was that the Spiritual Power of all of us here comes through the Thunderbird. This is an important and powerful trail that has to be guarded and protected, because there are many gifts that Indian people, indeed all people, still need” (Latady and Isham 2011:4, 6.5.1).

Writing in general about this region, 19th-century surveyor and mineral explorer George R. Stuntz noted, ”traditions of the Chippewa inform us that they found these trails in their present condition when they drove the Sioux Indians out and took possession of the country” (Stuntz 1885:85). Trail routes were subject to seasonal variation. Geologists working on surveys for the State of Minnesota explored the area northeast of the APE, along the Dunka River near Birch Lake (northeast of the NorthMet Project). Alexander Winchell described his 1886 visit to the "Indian winter trail" crossing Sections 10 and 15 of T60N, R12W. Township 60N, Ranges 12 and 13W were the focus of some of the earliest geological explorations of the Mesabi iron range. Winchell noted:

> The river can be ascended by a canoe about half a mile, although there is a copious delta accumulation at the mouth, consisting of sand, which extends far into the lake, producing so shallow water that a small bark canoe drags on the bottom when carrying two men. The Indian winter trail, which leads to Beaver Bay on Lake Superior, leaves the right bank of the river near the town-line between 61-12 and 60-12, and it can easily be followed as far as we went, and probably all the way to Lake Superior. It is obstructed by numerous old pines and poplars thrown down by the wind. It crosses the river in S. W. 1/4 sec.10, 60-12, and again in sec. 15, next south, and then bears more easterly. The country through which it passes is chiefly drift covered, and holds considerable good pine, though chiefly Norway averaging 16 to 20 inches in diameter. Ten years' growth will make it very valuable. (Winchell 1887:341).

The relationship of this trail to trade and mining exploration is noted by Davis (1968). He describes the portions of the route between the Beaver Bay townsite (1856) on Lake Superior with Lake Vermilion. Greenwood Lake (T58N, R10W) and Birch Lake (T61N, R12W) were large water bodies along the route, which also crossed the Cloquet, Greenwood, and Dunka Rivers. Davis describes use of the trail by the Ojibwe, traders, and mid-19th-century geologists, noting, “ore samples were brought down the Beaver Bay-Vermillion trail by local Ojibwa during the 1865 Eames party expedition to the Vermilion” (Davis 1968:64). Eames was the Minnesota state geologist “responsible for initiating the gold excitement at Vermilion Lake” that occupied investors for several years (Walker 1979:74). Davis describes the route taken from Greenwood Lake to Babbitt as consisting of “waterways and portages,” rather than an overland route (Davis 1968:66). In a review essay of this work, L. Johnson notes that Davis is likely referring to the Greenwood River–Stony River–Birch Lake route that Stuntz and others used to access the Vermilion Range (from Birch Lake the route went through White Iron, Fall, Shagwa, Burtside, Burntside River, Mud Creek portage, into Vermilion). Surveyor Christian Wieland collected iron

ore samples, which he delivered to the Ontanagon Pool, a mining syndicate. This group of Minnesota and Michigan speculators unsuccessfully attempted to develop the eastern Mesabi iron range in the 1870s (Walker 1979:74-76; L. Johnson 2012).

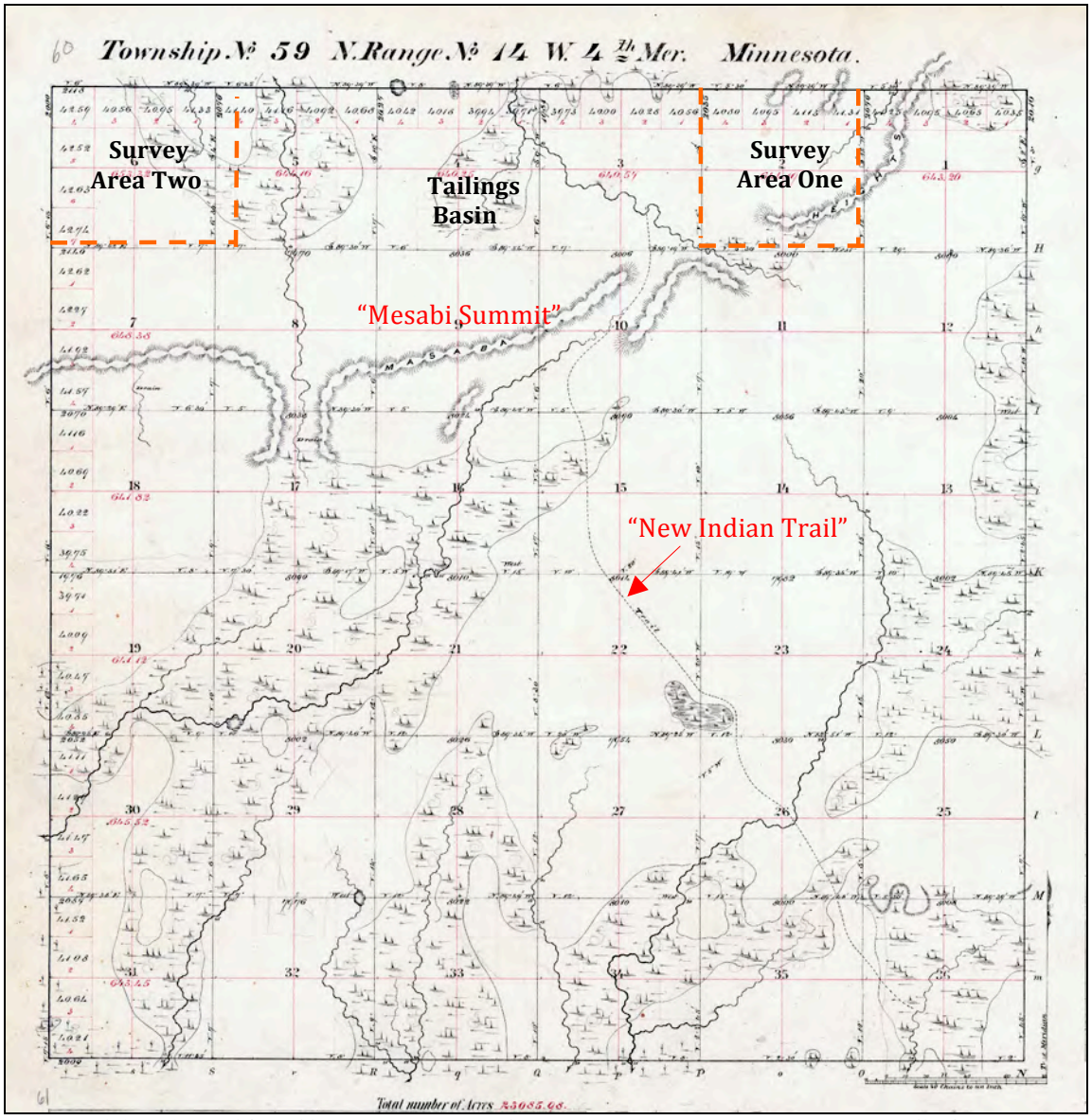

Figure 26. T59N, R14W, 1875. An example of the township maps produced by the GLO. Mesabi Summit and trail labeled by surveyor. See Maps 17, 18 for trail routes shown on topographic and aerial views. GLO (U. S. Surveyor General).

As discussed in Section 3.1.3, the research on trails attempted to expand the information shown by Trygg (1966:17). (See Appendix Section 6.11 for additional information.) Trail points recorded by GLO surveyors in field books (and drawn on GLO township maps dating from 1874 to 1883) and delineated by Trygg in 1966 were plotted on aerial and topographical maps (Maps 8-9, 17-18; Figure 27). Of particular interest are areas such as the intersection of the "Indian Trail from Lake Vermilion to Beaver Bay" and the "New Indian Trail" in Section 3 of T59N, R14W. This location is also adjacent to the overlook on a granite-capped promonotory that provides

vistas of forested hills as well as low-lying areas (Section 3.2.11). Archaeologists have observed that linear travel portions of trails generally do not have many cultural materials directly associated with them. Cultural materials are more likely to be lost or discarded where trails meet or where they end or begin at other features, such as bodies of water (Thompson et al. 1996). Trails shown on the Trygg Map (1966:17; Map 9) and the trail points noted by surveyors generally followed the highest and driest overland routes. Within Survey Areas One and Two, the identified trails appear to represent the shortest-distance routes between Lake Vermilion and Lake Superior. Subsidiary trails would have potentially linked to hunting and fishing points, features such as promontories, and special plant communities (Maps 8-9, 17).

3.2.12.1 Archaeological Reconnaissance for Indian Trails

3.2.12.2 Indian Trail from Lake Vermilion to Beaver Bay

Indian trails were the subject of reconnaissance surveys in 2010-2012. The "Indian Trail from Lake Vermilion to Beaver Bay" in Section 2 of T59N, R13W, as noted in GLO surveyor's fieldbooks and drawn and labeled by Trygg (1966:17; Map 9), was the focus of investigation on six different occasions, including fairly extensive shovel testing during two site visits (Figure 27). Archaeologist Bradley Johnson led the surveys, with additional participants, including Band members, varying from survey to survey. The final survey was conducted on June 26-27, 2012. In addition to Grand Portage, Bois Forte, Fond du Lac and Bad River band members, this survey also included USFS staff, consultants, and SHPO archaeologist David Mather.

(Note: see Appendix Section 6.10.2 for additional maps accompanying the following fieldwork report adapted from B. Johnson 2012.)

On June 9, 2010, following visits to the Spring Mine Lake Sugarbush (Section 3.2.10.2) and the "Indian Trail" north of Dunka Road, the survey group first went to Forest Service Road 109 in Section 2 and traveled north on the road where it intersected the trail from Lake Vermilion to Beaver Bay. Initial investigation began at this point, where there was a corridor that had been brushed out, but was not shown on the maps or data on the GPS. The corridor trended in the direction of the trail under study. In general, the area was crisscrossed with not only various USFS roads, but other, more poorly defined roads that were not marked on the maps. Pomeroy, who visited the area in 2004, commented that most of these roads were the result of mineral exploration. One possible trail remnant was observed along the GPS coordinates that approximated the trail corridor as shown on the Trygg Map. It was clearly not a result of mineral exploration and was older than USFS roads. It was a short segment of a once well-established trail or road. Overall, this area was fairly level to gently rolling, with a birch, aspen, balsam fir, spruce, and jack pine forest. Some sugar maple was also noted (Figure 27; B. Johnson 2012).

On July 15, 2010, Johnson and Whitmore returned to further investigate the corridor of the Vermilion-to-Beaver Bay Trail in Section 2 (Figure 27). Access to this area was again from USFS Road 109 north of Dunka Road and began at the point where this road intersected this trail as previously noted. The goal was to walk as much of the trail corridor to the northwest of this location as possible and observe general characteristics including any potential trail remnants. For the most part, this corridor traversed gently rolling terrain forested with a mix of white spruce, aspen, birch, jack pine, and balsam fir. There were also occasional sugar maples most notably at the southeastern end of the area nearer the USFS road. The northwestern end of this corridor was black spruce swamp that probably continued to the Partridge River. During this investigation, few roads were observed that did not appear to have resulted from recent mining activity. None of them appeared to travel in the direction of the trail corridor as shown on the Trygg Map. Next, the

area to the east was explored to locate the survey point on the Vermilion-to-Beaver Bay trail recorded during the GLO surveys. Several features of potential significance were observed. There was a well-defined trail segment that, more or less, led to a prominent linear landform trending roughly in a north–south direction. Running along this landform was another well-defined trail segment (B. Johnson 2012).

The trail segment leading to the linear landform is very close to the location of the Vermilion-to-Beaver Bay trail as surveyed in 1873 and trends in the same direction. It did not appear to have any relationship to Forest Service roads or activities related to mining activity. It was clearly very much older than the other roads observed and the trail morphology and vegetation indicated that it was not simply a game trail. The linear landform was roughly seven to eight feet higher than the immediate area. The vegetation was mostly birch, jack pine, spruce, and aspen, with some blueberries. Immediately adjacent to the landform on its south and east was a large bog. This landform had minimal underbrush resulting in very good visibility along the trail that ran its length (B. Johnson 2012).

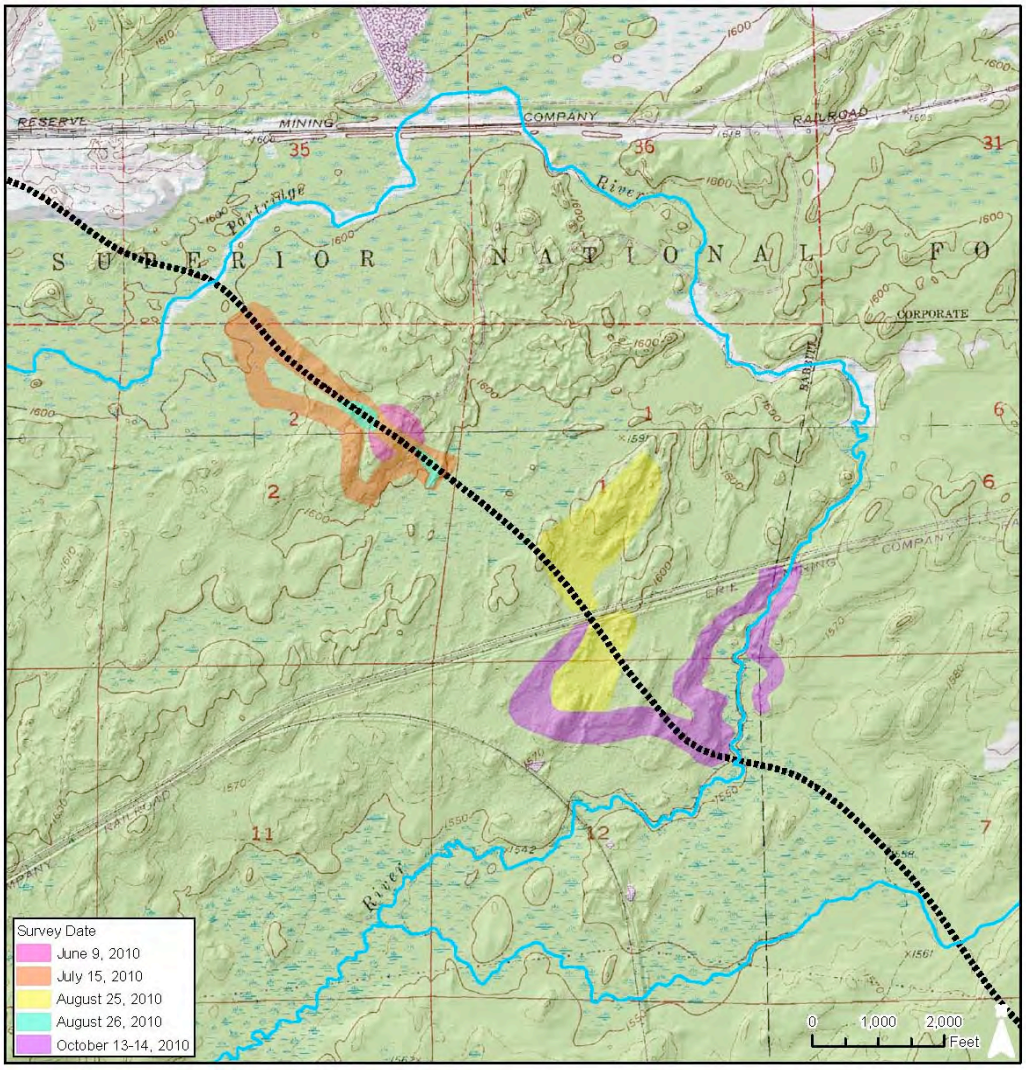

Figure 27. Indian Trail survey areas: June 9, 2010 through October 13-14, 2010; also resurvey on June 26-27, 2012. Trygg route shown as black dashed line. See also Map 21. Corps.

No surface features were observed on the landform other than the trail and a number of open, rectangular holes about 20 x 20 cm in size. Further inquiry into the origin of the rectangular holes revealed they resulted from the Phase I archaeological survey completed by Soils Consulting (2005). That survey placed 10 shovel tests along a suspected shoreline feature, which was this linear landform. All shovel tests were negative. Overall, this area had the feeling of a well-used portage trail or overland route, skirting the large bog to the east.

Figure 28. Looking northwest from the starting point on 7/9/2010, showing brushed-out corridor that followed the approximate alignment of the Vermilion-to-Beaver Bay Trail. Corps photo.

The investigation on August 25, 2010 began on Dunka Road at the location where the Vermilion-to-Beaver Bay trail corridor crosses Dunka Road in Section 1 of T59N, R13W (Figure 27). Johnson and Bob Swanson from Grand Portage investigated an area south of Dunka Road. In this area, the GLO survey notebook provided a location where the trail crossed the line between sections 1 and 12. This survey area could be described as consisting of three areas. The first was to the north of a large clearing and includes the western half of the area surveyed. The first had a somewhat irregular topographic land surface and was very brushy, making walking difficult. The second was a large clearing that had a north-south central ridge. The third was north of the clearing and included the eastern portion of the surveyed area (B. Johnson 2012).

The eastern portion of the survey area included the location of the trail as recorded in the GLO survey notebook. It was very level with a well-developed braided trail system that ran from the clearing along the approximate route of the trail corridor to Dunka Road. The area provided a sense of an established travel corridor along a landform, between much lower areas to the east and west. The low areas appeared to forested wetland, but this observation is not confirmed. It was very similar to locations noted along other portions of the trail corridor. The portion of the trail corridor north of Dunka Road was also investigated (Figure 27). As the corridor was followed north a trail system was observed, but it did not have the same well-established travel corridor as south of Dunka Road. Further north from Dunka Road, it appeared that the corridor, such that it was, trended to the east and followed the upland south of a large bog area. This is the

same bog that was adjacent to the linear landform visited on July 15th. An interesting surface feature was a 5-meter channel defined by ledge rock on either side. It gave the impression of being a water-eroded channel, perhaps an outlet from the bog, or former lake, at some point in its past. Once across the channel, the upland once again had a well-defined trail system that continued to the east, trending north (B. Johnson 2012).

Figure 29. Looking north across the northern part of the clearing, Section 1 of T59N, R13W, 8/25/2010. Corps photo.

On August 26th, Johnson and Pomeroy investigated two areas along the Vermilion-to-Beaver Bay Trail. One location was the linear landform visited on July 15th by the Corps and the other was an area on or near the trail corridor (Figure 27). The Corps investigation on July 15th did not encounter the area on or near the corridor that was observed during this reconnaissance (Figure 27). Pomeroy collected plant information at both locations. Near the area on or near the Vermilion-to-Beaver Bay trail there was a generally level corridor with well-developed, braided animal trails (B. Johnson 2012).

On October 13th, Johnson and Tim Peterson from the Corps and Bill Clayton and Heather Hoffman of the USFS conducted a reconnaissance of the area where the Vermilion-to-Beaver Bay trail crosses the Partridge River and shovel tested that location where appropriate (Figure 27). The route to the point where the trail crossed the Partridge River traversed a portion of a previous survey area, particularly the area that had been clear-cut south of Dunka Road. One notable observation was the presence of white or bur oak oak seedlings first observed toward the eastern side of the clear-cut. The extent of these seedlings is not known at this time. After crossing the clear-cut, a relatively flat area in the forest that was crisscrossed by a network of braided trails leading to the river crossing was found and may be an extension of the trails observed August 25th between the clear-cut and Dunka Road. Twenty-one shovel tests were placed at the Partridge River crossing location and along the east side of the river heading north from the crossing, but this was halted where the upland turned away from the river as the wetland adjacent to the river became wider. No cultural materials were identified in any of the shovel tests. However, at or near the crossing location on the Trygg Map, there are several large glacial erratics. While of no surprise in a landscape shaped by glacial ice, similar rocks were not observed in any other portion of the project area investigated to date (B. Johnson 2012).

On October 14th, a reconnaissance of the eastern side of the river where the Vermilion-to-Beaver Bay trail crossed the Partridge River and shovel testing, as appropriate, was completed (Figure 27). The investigation started just off of Dunka Road east of the river. The upland here was

higher in elevation with a steep drop to the river. Moving to the south along the river toward the crossing location, the slope to the river lessened, as did the elevation above the river. Fifty-two shovel tests were placed along this side of the river, beginning from a point south of Dunka Road to a point where the wetland areas became considerably wider and a crossing less probable. All of the shovel tests were negative for cultural materials. Toward the northern portion of the area surveyed, however, a metal pipe and a brick were observed, both possibly relating to logging activities (B. Johnson 2012).

3.2.12.3 "Indian Trail"

GLO survey points from 1872-1882 and from the Trygg Map (1966:17; Map 9) were the basis of the initial survey on June 9, 2010 conducted by Corps archaeologist Bradley Johnson and other participants. The "Indian Trail" labeled by Trygg as intersecting with the Dunka Road followed a well-defined trail that resembled a former road (Map 9). The location of the trail appeared consistent with the Trygg route. At the time, it seemed reasonable to believe that this road may represent continued use of the original Indian trail. Consulting botanist Deb Pomeroy, who visited the area in 2004, said she had observed this road and noticed a license plate dating to the 1920s.

On July 13, Johnson and Claire Whitmore from the Corps met Rick Guitar from the Fond du Lac Band and Barr consultants. The objective was to explore a portion of the "Indian Trail" corridor from its intersection with Dunka Road to its crossing of Yelp Creek in section 3 and 10 of T59N, R13W as shown on the Trygg Map (1966:17; Figure 27). During the June 9 visit, GPS coordinates were collected for an old road that may have represented a portion of the trail. To begin the investigation it was intended to find the point on the old road noted above, but this was unsuccessful. The GPS indicated that the group was close, but walked past the road observed on June 9th. The group continued to walk roughly parallel transects along the trail corridor as shown on the Trygg Map to a point about midway to Yelp Creek. At that point, they circled to the west to investigate the point that GLO surveyors recorded in 1873. The approximate location of that point is on a relatively flat, well-defined upland adjacent to an extensive deep marsh to the west. This location does have a well-defined trail, which is evidently used by game as well as people. Although it is not certain when the last time the trail was used or maintained, logs that fell across the trail had sections removed to allow unobstructed passage. The width and configuration of the trail indicates use as a footpath and not an ATV trail. It had only one well-used path worn into the ground (B. Johnson 2012).

Figure 30. Deep marsh west of trail near Yelp Creek, Yelp Creek, 7/13/2010. Corps photo.

The focus of the trail reconnaissance effort next shifted back to the trail corridor. Roughly parallel transects were walked north toward Yelp Creek. The area to the east-northeast of the deep marsh had quite a few recent trails cut through the forest, probably as a result of PolyMet exploration. Much of the area was a poorly defined upland with little relief dominated by birch, aspen, balsam fir, and white spruce, eventually becoming an expansive black spruce bog in the northern portion of this section. A winter road that has been cut through this bog was followed to an upland, island-like landform; this was the northern-most point investigated (B. Johnson 2012).

Figure 31. Black Spruce bog, 7/13/10. Corps photo.

Next the group began at the western end of the upland landform and walked transects to the east looking for any trail remnant. No trail remnants other than possibly the Forest Service road were observed. The area between this upland and the Partridge River was not investigated, because aerial photography suggested that it was entirely spruce bog, which suggested an increasing difficulty for walking and a very low probability of finding a trail or other cultural features.

On July 14, Corps staff returned to the trail corridor walked the day before to make another effort to locate the road that was recorded on June 9. This time the trail was located and followed to its end (Figure 27). Contrary to expectations, the trail veered to the east for a short distance and appeared to end at the site of a possible logging operation. This site was adjacent to and on both sides of the Forest Service Road 108. The trail appears to be a rail spur, because the road cuts that were observed indicate that there was a considerable effort to keep the grade to a minimum. Borrow pits, a possible corduroy road, and various artifacts were observed near the road terminus.

This area is a previously unidentified archaeological site that almost certainly relates to the extensive logging activity in the area. The site was reported in the Superior National site records and may need to be evaluated under the Northern Minnesota Lumbering Context (1870s-1930s; see also Section 3.2.18. It is obviously connected to the transportation system in this region and may have been positioned to take advantage of existing transportation routes or corridors. The site is within the proposed Project Mine Site and the U.S. Forest Service land exchange. North of this area and trending toward the location of the “Indian Trail” was a very well established system of game trails that traversed a fairly level corridor. This trail system was not followed, but it appeared that it trended generally north along the corridor mapped by Trygg (1966:17) and the area of the deep marsh visited on July 13 (B. Johnson 2012).

Figure 32. Logging debris, 7/13/10. Corps photo.

3.2.12.4 Indian Trail Fieldwork Conclusions

The 2010-2012 fieldwork confirmed the difficulty of precisely locating specific Indian trails that might have had seasonal variation and have had little human use in recent decades. However, the fieldwork suggests that identifiable short segments exist at the intersection of the Vermilion-to-Beaver Bay and New Indian trails in the NW 1/4 of the NE 1/4 of Section 3 of T59N, R14W (SL-HLC- 018). This trail intersection, as shown by Trygg (1966:17) is southwest of a prominent landform and overlook on the south slope of the *Missabe Widjiw* (Laurentian Divide; see Section 3.2.11.1; Map 21).

A 10,900-foot corridor (Figure 27) of the Lake Vermilion-to-Beaver Bay Trail also appears to contain segments of seasonal trails. June 2012 fieldwork confirmed or expanded findings of earlier work, and also included discovery of petroforms south of the Partridge River (Figure 33). Overall, it appears that the route delineated by Trygg across Sections 1, 2, and 12 of T59N, R13W and Section 35 of T60N, R13W represents a corridor that likely contained various trails (B. Johnson 2012; Map 21; SL-HLC-019). See Section 4.0 and Appendix Section 6.10.2 for further evaluation.

Figure 33. Petroform south of Partridge River, 7/26/12. Barr photo.

3.2.12.5 Plant Surveys Adjacent to Trails

The various plant communities are distributed in a more or less random, diffuse pattern across the study area. No identifiable artificial or managed pattern could be discerned in the distribution of the vegetation communities, apart from logged areas and the Spring Mine Lake Sugarbush site. (Maps 14, 15, 17, 18). There is no pattern of vegetation communities along the mapped trail locations that differs from the diffuse distribution of these communities across the study area. In other words, the distribution and abundance of plant communities and of individual plant species does not appear to be tied to any specific trails or destinations in the study area. The probability of finding a given plant in a particular vegetation community along the mapped trails is the same as finding that plant and vegetation community anywhere else in the study area. (See plant survey methods, Section 6.1, as well as 6.1.3.3 for trail vegetation methods.)

3.2.13 Water Routes and Portage Trails

Figure 34. J. N. Nicollet, *Hydrographical Basin of the Upper Mississippi River* (1843). Embarrass River below Missabay Heights shown at arrow.

The portage trails used by the Ojibwe were well established by earlier inhabitants of the Woodland Tradition, which dates from 2,800 BP to European contact. Historians note that "by the time of initial European contact, Minnesota was crisscrossed with an intricate network of interconnected land and water routes. . . ." (Vogel and Stanley 1991b:E-9). By the mid-17th century, European explorers and fur traders as well as native peoples used Embarrass Lake and the Embarrass River, both tributaries of the St. Louis River, in their travels across northeastern Minnesota. Mineral prospector and U.S. General Land Office Surveyor George R. Stuntz (1820-1902) observed the series of water routes and trails that connected dispersed settlements of Ojibwe (Gronhovd 2007:15). Stuntz called the Embarrass the "great thoroughfare" and wrote in 1885 that Ojibwe tradition maintained that they "found the trails in their present condition when they drove the Dakota out" (Stuntz 1885:85). He recorded a boulder dam in T58N, R16W where the Vermilion Trail crossed the Embarrass River and described the rock and boulder construction of the dam and its purpose to raise the water level for navigation (Stuntz 1885:85).

In 1886 geologist Alexander Winchell explored the area east of Lake Vermilion and northeast of the project APE, along the Dunka River near Birch Lake. He noted of the twenty-four townships he covered that there were "no public roads within the region . . . not over a half dozen settlers were seen in all the region, and these were located in the cheapest log cabins . . . not a single Indian was found resident in the district, and only about four square rods of soil were found cultivated" (Winchell 1887:13). He observed, "the exclusive mode of travel and transportation is by birch bark canoe of Indian manufacture." He provided an eyewitness account of portage trails:

> A canoe 6 to 18 feet in length will carry three men and the requisite baggage for camping, provisions and work. Between the lakes portages are made, the canoe being transported by itself; generally on the head and shoulders of one man, and the baggage being separated into as many bundles as necessary. The portages over the routes most traveled are from a quarter of a mile to more than a mile in length. They are simply winding footpaths leading by the nearest practical route over plains and rocky hills and across swamp and bogs. The best have at some time been cut out sufficiently for the transportation of the canoe, but the portage trail consists chiefly of a path more or less beaten by long continued Indian travel. On some of the principal trails the path is in places deeply worn, but always narrow. On other trails the marks of travel are so obscure that much difficulty arises in picking the way. The work of the past season rendered it necessary to traverse 123 portages, having a total length of 43 miles (Winchell 1887:13-14).

Winchell also traced the east-west routes of communication between Indian settlements at Beaver Bay and Pigeon River, and from Lake Vermilion and the Upper Mississippi and beyond (Winchell 1887:114).

3.2.13.1 Height of Land Portage

The portage trail linking the Embarrass River and Pike River and Lake Vermilion in northeastern St. Louis County was first shown on an 1826 map drawn by British explorer Samuel Thompson and appears in the notes of other 19th-century explorers (Vogel and Stanley 1991a:7-5). In 1849 Dr. Joseph G. Norwood made a reconnaissance of the St. Louis River-Vermilion Lake region and described his traverse of the Height of Land about one mile above the Embarrass River Portage (Vogel and Stanley 1991a:7-5). Norwood described what appeared to be artificial rock dams in both the Pike and Embarrass Rivers; Stuntz attributed these to Native Americans (Vogel and Stanley 1991a:7-6; Stuntz 1885:85-87). As documented in 1991, the identifiable segments of the portage extend from the Embarrass River in Section 7 of T59N, R15W to the Pike River in T60N R16W and cross the Laurentian Divide at an elevation of about 1,450 feet (Vogel and Stanley 1991a:7-1).

As noted by Vogel and Stanley:

> The Height of Land Portage was probably used by Pre-contact American Indians, who may have pointed out its location to early European visitors. The role played by waterborne transportation in the trade route geography of the Pre-contact Laurel and Blackduck cultural traditions is not well understood. During the contact period, Siouan-specking Assinboin Indians occupied portions of the St. Louis and Rainy Lake watersheds and may have been reached by French traders as early as the 1650s. The Algonquin speaking Ojibwe or Chippewa Indians, driven westward by Iroquois pressure, migrated into northern Minnesota in the mid-17th century and doubtless brought the birchbark canoe culture with them (Vogel and Stanley 1991a: 8-2).

In 1976 MHS archaeologist Douglas A. Birk surveyed and mapped part of the route and recommended that several segments were eligible for the NRHP. The segments were listed in 1991 for significance during the period ca. 1630s–1870, when the portages were in continuous use by Indians, fur traders, explorers, scientists, loggers, mineral prospectors and surveyors (Vogel and Stanley 1991b).

A trail crossing of the Partridge River in T59N, R13W, south of Dunka Road, was investigated in 2010, in June 2011 and in June 2012 (Sections 3.2.12.1-3).

3.2.14 Topographic Features and Place Names

Place names within the APE constitute a potentially rich source of information about the Pre-Contact and Contact Period landscape (Table 5). Some place names may have been composed by early 20th-century highway engineers or recent mapmakers, but all deserve scrutiny. Reverend Joseph A. Gilfillan (1838-1913), a missionary to the White Earth Reservation (1872-1908) and student of the Ojibwe language, compiled a gazetteer of Ojibwe place names including those in St. Louis County. Geologist and historian Warren Upham (1850–1934) compiled St. Louis County place names, with references to Ojibwe sources (Upham 1969:476-506).

Several names are layered over the 1,850-foot elevation of the Embarrass Mountains edging the low-lying wetlands and forested uplands of the study area. This portion of the Mesabi iron range and Laurentian Divide occupies the crest of a line of low, rugged, Precambrian rock hills also known as the Giant's Ridge where the divide separates the waters flowing north to the Arctic Ocean and south to the Atlantic Ocean. As noted in Section 3.2.1, Nicollet's "Hydrographical Basin of the Upper Mississippi River" (1843) labeled the area as "Missabay Heights" (Upham 1969:503). Joseph G. Norwood called the Heights "missabe wachu," or "Big Man Hills." Gilfillan (1886) noted the Ojibwe name as "missabe wudjiu or Giant Mountain." He reported, "Missabe is a giant of immense size . . . This is his mountain, consequently the highest, biggest mountain" (Upham 1969:504). State geologist Henry H. Eames standardized the term as "Mesabi Range" (Upham 1969:504).

Table 5. Summary of Place Names and Landscape Features.
Townsite, mine, lumber camp, and railroad names are not shown.

Name	Location	Type	Source	Ojibwe (Gilfillan 1886) or other Euro-American comment
Colby Lake	T58N, R14W, Secs 7, 8	Lake	USGS 7.5 ' Quad Allen 1949	
Colvin Creek and Rapids	T59N, R13W, Secs 28, 33	Creek	USGS 7.5' Quad Hibbing 1954 rev. 1979	
Cranberry Creek	T59N, R12W, Sec 17	Creek	USGS 7.5 ' Quad Allen 1949	
Cranberry Lake	T59N, R13W, Sec 17	Lake / wetland	USGS 7.5 ' Quad Allen 1949	
Embarrass Lake	T58N, R15W, Sec 6	Lake	USGS 7.5 ' Quad Allen 1949	Portion in APE; includes portion of Height of Land Portage
Embarrass River	Portions of T58N, R14W, T59N, R15W, T60N, R15W, T60N, R14W, T60N, R13W, T60N, R12W, T59N, R12W, T59N, R13W, T58N, R13W	River	U.S. GLO Township Map 1872	*Ga-ti'-ti-sa'-wang-gid'-dji-wun'-o zi'-bi* The river with the sand whirling round in the water by force of the current (Gilfillan)
Embarrass Mountains	T59N, R14W, Sec 11-14; T59N, R15W; Sec 7-8, 17-18	Landform	USGS 7.5 ' Quad Allen 1949	
Embarrass Valley	T59 N, R15W, Secs 11-15	Valley	Lamppa (2004:231)	"The view across the Embarrass valley was spectacular" Lamppa (2004:231).
Esquagama Lake	T59N, R15W, Secs 30, 32	Lake	USGS 7.5 ' Quad Allen 1949	French: Last Water or Last Lake (Upham 1969:500). Appears as Wynne Lake on modern maps.
First Creek	T58N, R15W, Secs 11-12	Creek	U.S. GLO Township Map 1881	
Hay Lake		Lake / wetland	USGS 7.5 ' Quad Allen 1949	
Heikkila Lake	T60N, R14W, Sec 30	Lake / wetland	USGS 7.5 ' Quad Allen 1949	
Iron Lake	T60N, R13W, Secs 23-24	Lake/ wetland	USGS 7.5 ' Quad Allen 1949	Known as Thevot Lake (Upham 1969:501).
Kaunonen Lake	T60N, R14W, Sec 22	Lake / wetland	USGS 7.5 ' Quad Allen 1949	
Little Mesaba Lake	T59N, R15W, Secs 27-28	Lake (Mine pit)		

Name	Location	Type	Source	Ojibwe (Gilfillan) Name or other Euro-American Comment
Little Mud Hen Lake		Lake / wetland		
Little Rice Lake		Lake / wetland		
Longnose Creek	T59N, R13W, Sec 19, 30	Creek		
Masaba Heights	T59N, R14W, Sec 1-2, 7-11	Landform	U.S. GLO Township Map 1879	
Missabay Heights (Nicollet 1843); Big Man Hills *missabe wachu* (Norwood 1848); Giant mountain or *bissabe wudjiu* (Gilfillan); Upham 1969:502-504 (see Summit of a Range of Hills); Mesabi Range (Eames 1866).	T59N, R14W	Landform	Nicollet 1843	*Bissabe wudjiu (*Gilfillan) *Missabe Wdjiw* (Ojibwe)
Moose Mountain	T58N, R14W, Sec 10	Hill	USGS 7.5 ' Quad Allen 1949	
Mud Lake	T59N, R13W, Sec 5	Lake	USGS 7.5 ' Quad Allen 1949	
Mud Lake	T60N, R14W, Sec 27	Wetland	USGS 7.5 ' Quad Allen 1949	
One Hundred Mile Swamp	T59N, R13W, Secs 4-6, 9-12, 16-18	Swamp	USGS 7.5 ' Quad Allen 1949	
Partridge Lake	T58N, R14W, Secs 7-8	Lake	U.S. GLO Township Map 1879	
Partridge River	T58N, R15W, Secs 12- 14; 22,- 23; T58N, R14W Secs 4-6, 8-9, 11- 12, 15; T58N, R13W, Secs 6-7. 28-29, 32	River	U.S. GLO Township Map 1881	*Bi-ne' zi'-bi* (Gilfillan)
Pike River	T60N, R15W, Secs 20, 21	River	U.S. GLO Township Map 1881	
Sabin Lake (Upham 1969: 500)	T58N, R15W, Secs 18, 19	Lake	USGS 7.5' Quad Hibbing 1954 rev. 1979	*Showininabo* (Wine Lake; grape-liquid lake)

Name	Location	Type	Source	Ojibwe (Gilfillan) or comment
Second Creek	T58N, R15W Sec. 2, 12; T59N, R15W Sec. 20, 30	Creek	U.S. GLO Township Map 1881	
Seven Beaver Lake	T58N, R12W	Lake	U.S. GLO Township Map 1872	Named by Ojibwe for beavers trapped or shot there (Upham 1969:500).
Spring Mine Lake and Creek	T59N, R14W Sec 11	Lake, creek (mine pit)	USGS 7.5 ' Quad Allen 1949	
St. Louis River	Through St. Louis County, including T58N, R12-15W	River	U.S. GLO Township Map 1874	*Ki'-chi-gum-i'-wi zi'-bi*The River of the Great Water (Lake Superior River); Gilfillan
Stevens Creek	T59N, R15W, Sec 23	Creek	USGS 7.5 ' Quad Allen 1949	
Summit of a Range of Hills	T60N, R15 Secs 1, 7, 13-14, 21-26, 29, 31	Landform	U.S. GLO Township Map 1872	
Thunderbird (Trail)	Along Laurentian Divide	Home of Thunderbird Spirit	Bois Forte Band elder interviews 2011	
Trimble Creek	T60N, R14W, Secs 17, 20, 28	Creek	BWCA Map McKenzie Maps	
Wetlegs Creek	T59N, R13W, Secs 20, 29	Creek	U.S. GLO Township Map 1881	
Whitewater Lake	T58N, R15W, Sec 18	Lake	USGS 7.5 ' Quad Allen 1949	
Wyman Creek	T59N, R14W, Secs 26, 34	Creek	U.S. GLO Township Map 1881	

Note: GLO Maps (1872-1881) may show creeks, rivers, and lakes without name labels.

3.2.15 Post-Contact Period Historic Contexts

The following historic contexts describe road and railroad construction, logging, agriculture, and mining activity within the APE. The timeframe spans construction of mining and logging roads and railroads to taconite development, ca. 1870–1970. These contexts are included in this study because they assist in understanding physical alterations to the Indian cultural landscape.

3.2.16 Roads

3.2.16.1 Vermilion Trail

Although late 19th-century logging roads traced the APE, no improved public roads were built across Survey Area One and Two until the early 20th century when Euro-American settlers established farms and organized township government. At the western edge of the larger APE, however, portions of the Vermilion Trail skirt the west side of the Embarrass River in T59N, R15W. This road was intially planned from Duluth to Tower via Pike Bay on Lake Vermilion to supply the short-lived enthusiasm over gold exploration at Lake Vermilion. Congressional funds

were sought to improve the rough winter route, and George Stuntz was its surveyor (Walker 1979:51). In 1869 work was underway to extend the rough trail to the Bois Forte Reservation (Walker 1979:22). During the 20th century the road was paved and later incorporated into County Highway 4 (Map 1).

The unsuccessful gold rush produced "speculative excitement that renewed and redirected attention to the west end of Lake Superior," although the iron ore resources of the area were "largely unnoticed" (Walker 1979:22). Exploration of the ores of the eastern Mesabi was finally underway during the late 1880s. In 1892 the Duluth and Iron Range Railroad (D&IR) was constructed north to Tower on the Vermilion Range (Walker 1979:49-58). Prior to this, all exploration of the Mesabi began at Mesaba on the D&IR and, according to Leith's account:

> reaching this place by rail, they were compelled to travel 12 to 50 miles to the west along "tote roads," which were all but impassable. The time, money, and energy needed to conduct even modest explorations at this time can be appreciated only by those who have experienced the difficulties of inland travel in the Lake Superior region away from railways. The stories of this "toting" period contain the usual records of misfortunes, lucky strikes, and enterprise incidental to a mining boom (Leith 1903:28).

As noted in 3.2.18, during the 1890s and into the 20th century, a network of logging roads were constructed across the APE. At some locations these roads were overlaid by early 20th-century forest service, mining and haul roads.

Figure 35. "Old Tote Road to Embarrass at Erie Mining Company, 1954."

3.2.16.2 Mesabi Trail / County Highway 26

A number of public roads were built across the APE during the natural-ore and taconite-mining period (Map 1). Some, such as County Road (CR) 666 have been in continuous use since construction, while others, such as Minnesota State Highway 35, were abandoned and sometimes replaced with alternate routes for mine expansion. An early network of trails and unpaved mine roads also linked the natural-ore mines and locations within the APE.

The Mesabi Trail as shown by Leith (1909; Figure 44) crosses Sections 25, 34, 35 and 36 of

T59R, 15W and 29 and 30 of T59N,14W within the APE. This road segment is associated with the late 19th-century exploration of the Mesabi iron range as well as the early 20th-century development of area natural ore mines. This trail (also known as the Mesabi Road) linked the Mesaba townsite with points to the west. Mesaba was the main outfitting point for westward exploration of the iron range following the completion of the D&IR (DM&IR) to Tower in 1884. Stage service was established on the road in 1892 (Lamppa 1962:47). Surveyor Edmund J. Longyear made his first westward journey in 1888, and described as the trail as "first a packer's trail, then a bridle path, and finally as the most execrable tote road imaginable, miles of torture for horses and wagoners alike, beset with mosquitoes and black flies in the spring and by heat and flies in summer." He recalled, "a carting business of such proportions as one can scarcely imagine made immediate use of every section of this Mesabi Trail as it opened up. Jostling and jolting over corduroy and muskeg, picking their way through the stumps . . . the great vans rattled, carrying everything except logs and lumber, that built Mountain Iron" (Longyear 1951:8). Survey and test drill sites for most of the early mines of the eastern Mesabi were accessed from this road. Called the Mesabi Trail by Longyear, labeled as the Mesabi Trail by Leith (1909), Old Mesabe Road by Hixson (1916), and the Old Aurora Road and Aurora-Biwabik Road by others, it is shown as Highway 26 by 1955 (GNOP 1955). By 1918 the segment west of the D&IR (DM&IR) spur in Section 35 was labeled as abandoned and a southerly route to Aurora was shown (Acton 1918). No published accounts consulted identify the Mesabi Trail as originating as an Indian trail.

As an improved county road framed by wetlands and mine pits, County Highway 26 linked the communities at the locations at the Stephens, Perkins, and other mines with Aurora and Mesaba. The road was abandoned after 1959 and two segments of the road were absorbed by development of LTVSMC Area 6 and Area 2WX. The remaining segment within the APE is a 20-foot-wide paved roadway extending between the Area 6 Pit in Section 35 of T59N, R14W and the Area 2 WX Pit in Section 30 of T59N, R14W. South of the Area 6 Pit, its extension appears to be County 716, which connects with E. 3rd Street in Aurora. Known locally as the Snake Trail, it does not connect with any other active routes in the immediate project vicinity (personal communication with Earl Wilkins, St. Louis County Highway Department, 12/15/2008).

3.2.16.3 State Highway 35

The north-south route of Minnesota State Highway 35 connecting Virginia with Aurora and Tower was constructed sometime between 1916 and 1918 (Hixson 1916; Acton 1918; Map 1; Figure 36). Known locally as the Aurora-Ely Road, it was paved south of Aurora and north to Embarrass by 1953 (Riner 2008). Construction of a haul road from the Stephens to the Donora Mine after 1959 included completion of an earth-and-culvert bridge over the highway (personal communication with Bruce Kettunen, NORAMCO Engineering Corp, 12/15/2008). The westward expansion of Erie/LTV Area 1 and Area 6 pits resulted in abandonment and replacement with the existing State Highway 135 to the west (Map 1).

Figure 36. Highway 35 construction in 1933 near Aurora.

3.2.17 Railroads

Beginning in the mid-1880s, mining railroads were built from Duluth to points northwest and west. Rail construction disturbed large if linear tracts of forest, and also required filling in lowland areas. In some cases the routes followed established Indian trails, including a stretch of the D&IR in Survey Area Two in T60N, R14W and T60N, 15W. Four lines are located within the APE (Map 1). The Duluth and Iron Range Railway (D&IR) traces portions of the APE and, as noted above, crosses Survey Area Two in T60N, R14W and T60N, R15W. The Duluth, Missabe and Northern Railway Company (DM&N) crosses the APE in T58N, 14W and T58N, 15W. Spurs of the Duluth, Missabe & Iron Range Railway Company DM&IR also serve T59N, R14W. The Erie Mining Railroad bisects Survey Area One across T59N, R13W and T59N, R12W.

3.2.17.1 Duluth and Iron Range Railway (D&IR)

In 1884, Charlemagne Tower built the 68-mile Duluth and Iron Range Railway (D&IR) to connect the Lake Superior ore docks at Two Harbors with the Soudan Mine near Tower on the Vermilion Iron Range (Prosser 1966:223). Illinois Steel acquired the D&IR in 1887. In 1901, Illinois Steel and the D&IR became part of the United States Steel Corporation (King 1972:75,77). Spurs were built to the Vivian, Knox, and Adriatic mines by 1909 (Leith 1909). Such spurs served mines and facilities at the mine and were often relocated because of mine expansion.

3.2.17.2 Duluth, Missabe and Northern Railway (DM&N)

The Duluth, Missabe and Northern Railway Company (DM&N) was incorporated in 1891 to ship ore from Mountain Iron and the Mesabi Iron Range (King 1972:46). The DM&N line reached Virginia in 1893 and became part of the Lake Superior Consolidated Iron Mines Company in 1894. In 1901 it became part of the United States Steel Corporation (King 1972:34, 36, 67, 81). This line passes through Sections 5 and 6 of T59N, R14W (SL-HLC-025). A spur was built from Colby Junction to the Stephens Mine in ca. 1903 (SL-HLC-024). The line extends northwest from the junction in Section 6 of T59N, R14W to Section 25 of T59N, R15W.

3.2.17.3 Duluth, Missabe and Iron Range Railway (DM&IR)

In 1930 the Duluth, Missabe & Northern Railway took over the operation of the D&IR. The two operations were managed separately as the Duluth, Missabe and Iron Range Railway (DM&IR).

The Missabe Division operated on the former DM&N trackage on the western portion of the system, and the Iron Range Division operated on the former D&IR trackage on the eastern portion of the system. In 1937 they were consolidated into a new corporation known as the Duluth, Missabe & Iron Range Railway Company (DM&IR; King 1972:119). In the mid-1950s the DM&IR extended spurs to the reopened Stephens and Knox mines and realigned a portion of the original Stephens spur. The Canadian National Railway acquired the DM&IR in 2004 (CN 2008).

3.2.17.4 Erie Mining Company Railroad

The 74-mile-long Erie Mining Company Railroad transported finished pellets from the Erie Mining Company plant at Hoyt Lakes to dock facilities at Taconite Harbor, 81 miles northeast of Duluth (Figure 37). On its southwesterly course to Taconite Harbor the route extends from the plant in T59N, R14W across Survey Area One in T59N, R13W.

The railroad allowed shipment of pellets across the Great Lakes to steel mills in Cleveland, Buffalo, and other locations. The Taconite Harbor facilities were constructed between 1954 and 1956 and included a 30-foot-deep harbor and a 2,434-foot-long concrete dock. In 1957 Erie Mining Company completed a power plant at Taconite Harbor to supply the harbor facilities and the plant at Hoyt Lakes. The DM&IR, a common carrier with a junction two miles south of the plant, could have provided rail service to Erie's Taconite Harbor facilities or to DM&IR's Two Harbors facilities, but "the kind, quality and cost of service did not fit into the overall requirements of the new taconite industry" (Witzig 1959:100). Erie Mining Company found the greatest economy in building its own single-purpose line as part of its industrial plant (EMC 1969a:22).

Figure 37. LTV (former Erie Mining Co.) ore line, Section 8, T59N R13W, looking east-southeast, 10/13/2011. Barr photo.

3.2.18 Logging

Limited commercial logging of white and red pine began in St. Louis County following the 1854 Treaty, which ceded the region around the northwestern tip of Lake Superior. By 1859, sawmills were operating at Duluth and Two Harbors (Birk 1998:6E). During this period the forests of the St. Croix Valley and Mississippi River headwaters were extensively exploited. There was moderate demand for lumber in the Duluth area until the local boom heralded by the completion of the Lake Superior and Mississippi Railroad from St. Paul to Duluth in 1869. Early sawmills at Duluth, Cloquet, and Tower competed with those in Superior, Wisconsin, and eventually overtook Michigan's output (Larson 1949:250-51).

Public land sales of 1875 and 1882 opened the Mesabi range lands to timber prospectors, and early investors in white pine were initially unaware of "what lay below the ground" (Lamppa 2004:104; Larson 1949:265-280). Railroads extended deep into the forest to bring the timber to Duluth: in 1892, the Duluth and Winnipeg Railroad built 100 miles of track from Duluth to Deer River, and the Duluth, Mississippi River and Northern Railroad connected to it at Swan River (Lamppa 2004:104). James J. Hill subsequently purchased both lines as well as the associated timber holdings, which proved to be productive mine land. By 1923, Hill's Great Northern Iron Ore Properties would total more than 65,000 acres (Lamppa 2004:105). The State of Minnesota also owned tens of thousands of acres because of its holdings of swamp and school lands.

Sawmill and early mine development overlapped, and mining and railroad construction were heavy lumber consumers. Sawmills were opened at Mesaba in 1891 and at Virginia in 1893 (Lamppa 2004:127; Larson 1949:253). Although interrupted by the Panic of 1893, the timber harvest across St. Louis County increased during the 1890s. The general peak of the industry was around 1902, but harvesting at the Red Lake and Nett Lake Indian reservations did not begin until this time (Birk 1998:E6). Birk notes, "while logging was the driving force to acquire Ojibwe lands in Minnesota and rapid destruction of the northern Minnesota ecology forced the Ojibwe to abandon many aspects of their traditional way of life," they also participated in the industry with employment in lumber camps (Birk 1998:E7).

There are four property types associated with the harvesting and transport of timber: habitation properties, including logging camps; transportation properties (including roads, railroads, dams, and bridges), complex properties (combinations of habitation and transportation properties), and "find spots," where object or artifact finds are made (Birk 1998:F10). Typical camps were comprised of a group of structures, usually of log construction, including a headquarters building, steam bath building, mess hall, kitchen, blacksmith shop, horse barns, root houses, and bunk houses. Camps and harvesting facilities were typically established in late summer and early fall prior to cutting timber. During the winter the felled trees were moved to landings or storage locations and floated to the mills (Bastis 2008:9). Logs were also skidded for loading on flatbed cars on rail spurs and were replaced in the 1920s by trucks.

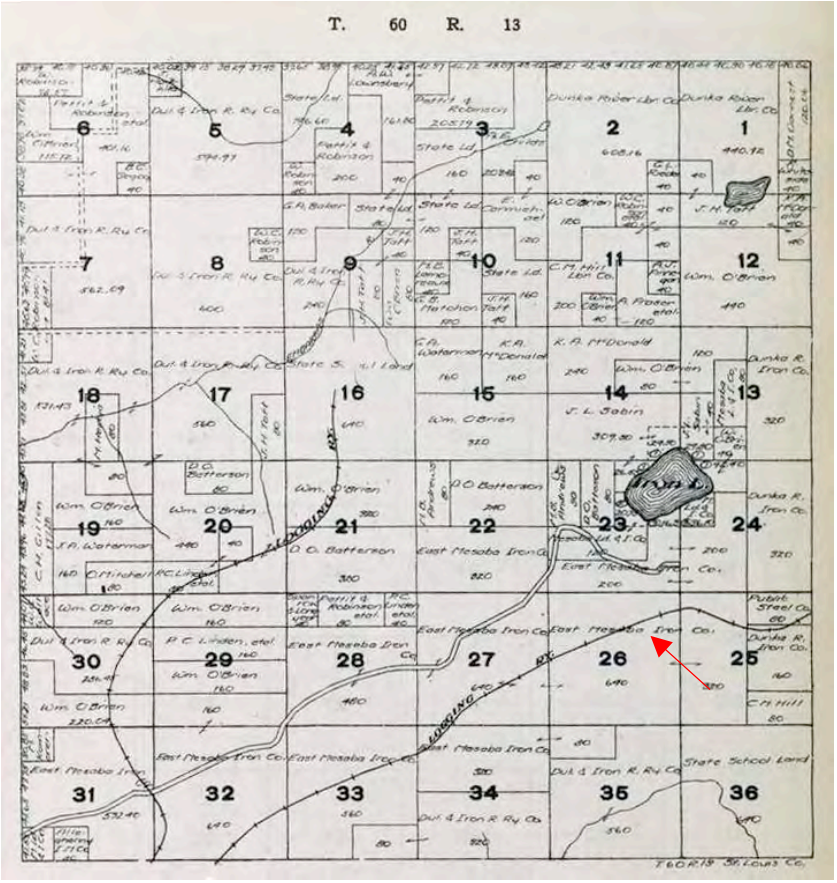

Figure 38. Logging spurs shown in 1916 in T60N, R13W St. Louis County (Hixson). Railroad in southwestern corner (arrow) is near northern boundary of Survey Area One.

One firm active in the study area was the Murphy Brothers Logging Company. The 1910 census recorded more than one hundred employees in a camp in T59N, R13W but no more information about its location was provided (U.S. Census 1910).

Survey Areas One (Map 1, Figure 38) and Two (Map 1) can be expected to have potential evidence of logging camps, logging roads and rail spur alignments from the late 19th and early 20th centuries; several logging camp locations have been identified in Survey Area Two in the MHS archaeological database (Table 3, Map 5), but there is little information about them. The Knox (Knott) Logging Camp (21SLmn/01-314) is located north of the Partridge River in the SW-SE-NE of Section 12, T59N, R13W, just outside of the Survey Area One boundary. This site was investigated in 2006 and was found to lack historic integrity due to recent and past logging activity (Soils Consulting 2006:9).

3.2.18.1 Plant Survey Results and Logging

The principal impact of logging has been to reduce white pine abundance in the study area. This is evidenced by the GLO surveyors' notation of white pine in multiple locations in the area, contrasted by the 2010 vegetation survey results that found white pine in only one of the fifteen fire-dependent community types (and of 43 overall plots). Logging has mimicked fire to a certain degree, by clearing areas, creating gaps for young seedlings and saplings to grow and exposing

mineral soil. However, logging impacts are notably different from fire as well, and the two cannot be accurately said to exert the same influences on vegetation community development.

Logging also creates improved deer habitat, creating conditions for deer population increases. Increased deer populations have a strong influence on vegetation community development, selecting against certain tree species (pine, cedar, oak, maple) and decreasing species diversity (Horsely et al 2003, Rooney and Waller 2002, Eschtruth and Battles 2009, Fisher and Klocksien 2003).

Prior to the initiation of widespread logging in the late 1800s and early 1900s, white pine (*Pinus strobus*) was a dominant tree across eastern North America, including Minnesota. White pine forest once covered over 28 million acres from New England to Minnesota. In the study area, red pine (*Pinus resinosa*) and jack pine (*Pinus banksiana*) were also present along with white pine. But white pine was a highly desirable tree in the late 19th and early 20th centuries. Euro-American settlers quickly recognized it as a valuable commodity for building construction and masts for ships. As a result, white pine was selectively removed from northern Minnesota forests, to the point where white pine covers less than half of its pre-settlement area. It has declined in Minnesota more than anywhere in the country (Fisher and Klocksien 2003).

Encroachment of settlement, disease and deer population increases have further influenced the decline of white pine. Settlement tended to follow logging, especially as forested areas were cleared and converted to agriculture. White pine blister rust, a fungal disease, arrived in the U.S. on pine seedlings shipped back from Europe in 1906 and quickly spread throughout the species' range. Mortality in mature pine stands from pine blister rust reached 50-80% in some stands (Ling 2003). Deaths from pine blister rust, along with logging practices and encroachment of settlement, fragmented the pine forest, creating a mosaic of isolated patches. This fragmentation encouraged an increase in the white-tailed deer population, which led to further deleterious effects on white pine forest through increased browsing and reduced regeneration of white pine seedlings into subcanopy trees (Fisher and Klocksien 2003). Deer populations also increased as their predators (e.g., wolves) were extirpated from the area. Finally, periodic catastrophic events such as the Hinckley Fire of 1894, which burned over 480 square miles of pine forest, also accelerated the decline of white pine. [Note: absent the direct and indirect influences of European settlers, white pine forest would probably have rebounded from a fire of the magnitude of the Hinckley fire, since pine is a fire-dependent species. However, stresses introduced by regional logging and settlement practices impeded the recovery of white pine after the Hinckley fire.]

The loss of white pine as a dominant canopy tree is probably the principal difference between the pre-contact and current upland vegetation communities in the study area. White pine would likely have been the dominant tree in the fire dependent communities that are seen on the site today. However, white pine was found on only one of the fifteen upland vegetation survey plots during the 2010 survey. In its place, the canopy and subcanopy of fire dependent communities are now dominated by a mixture of black spruce, white spruce, jack pine, paper birch, quaking aspen and balsam fir (Figure 39). Small red pine stands are also scattered throughout the study area.

Figure 39. Black spruce (green), tamarack (gold) and aspen (white) in Survey Area One, 10/13/2010. Barr photo.

GLO surveyors' notes from 1872 to 1882 indicate that the tree and shrub species in the study area at that time were substantially the same as in the current setting. The noteworthy exception is white pine, which appears on several of the surveyors' lists of trees during that time period. Again, white pine was only identified on one of fifteen upland plots in the 2010 survey.

Logging can approximate some of the effects of fire in these communities, by opening (removing) the canopy for light penetration to seedlings and exposing mineral soils. However, there are notable differences between logging and fire as well. Logging removes trees uniformly, rarely leaving remnant trees to act as seed sources. The dynamics of nutrient cycling also differ between logging and fire. Finally, logging promotes deer utilization of the cut-over area, resulting in a reduction in tree seedlings and declines in regeneration of species more preferred by deer. A number of studies (Horsely et al 2003, Rooney and Waller 2002, Eschtruth and Battles 2009) suggest that increased deer presence reduces species diversity, yields favorable competitive conditions for invasive species and selects against certain tree species, altering the canopy and subcanopy composition over time. Eventually, the suppression of fire and the influence of deer will exert an influence on vegetation communities in the area toward mesic-hardwood forest types. Currently, nine of the 24 upland plots identified are mesic-hardwood forest types.

Since fire-dependent community types persist as dominants in upland areas, however, many of the shrub and herb species available pre-contact remain in the study area. However, due to continued high deer populations, plant diversity is likely lower than in pre-Contact Period communities. Herbivory by deer continues to suppress regeneration of white pine, white cedar, oaks and other species favored by deer.

Wetland communities in the study area are probably somewhat more prevalent now than pre-contact, especially in Survey Area One north of the tailings basin. This is due to increased beaver activity, primarily north of the tailings basin. However, plant species in the various wetland communities now are likely very similar to those pre-contact. (See plant survey methods, Appendix Section 6.1).

3.2.19 Agricultural Development

Figure 40. D&IR Railroad building a road on the Mesabi iron range as an inducement to farmers, 1910.

Euro-American agricultural settlement within Survey Areas One and Two did not begin until the turn of the 20th century and followed the harvest of timber and the movement of immigrant miners into the area. Agricultural practices including, but not limited to, crop cultivation and livestock grazing, ditching, and road construction had significant impact on the Pre-Contact Period Native American landscape. Although the Homestead Act of 1862 provided for claims of 160 acres intended for farm settlement, much of the low-lying and swampland within Survey Area One and Two was not attractive to potential homesteaders and much of it was instead secured by timber and railroad companies, and later by mining firms (Figures 40, 41).

Early 20th-century farmsteads were established in various locations across the APE (Figure 30). Survey Area Two, which includes a portion of T60N, R14W (Waasa Township) south of the Embarrass River, was settled almost exclusively by Finnish immigrant farmers, as was adjoining T60N, R15W (Embarrass Township). The area's agricultural potential did not impress the surveyors; in 1882, Duncan Cameron and O. L. Rash, working for George R. Stuntz, described T60N, R14W:

> This township lies on the north slope of the Massaba Range on the upper valley of the Embarrass River. It is principally valuable for its tamarac and cedar timber, and for its large deposits of peat. It is nearly all swamp, resting on the bed of an ancient lake. The streams are all sluggish. Impenetrable thickets of Fir, and fallen timber, rendered the survey an exceedingly tedious process.

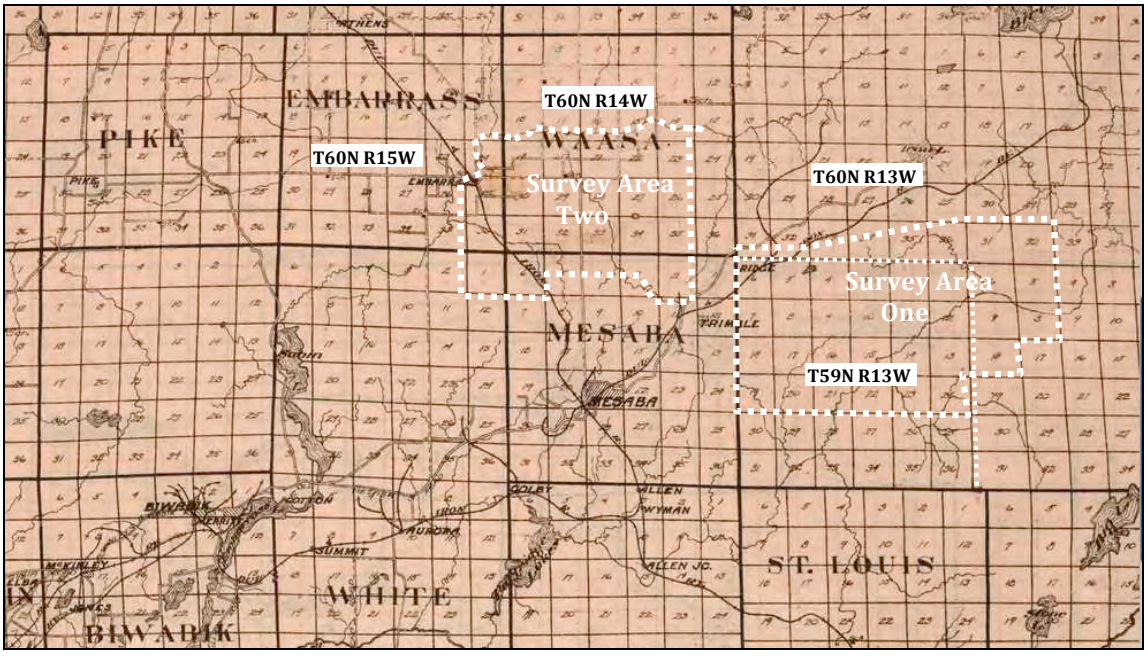

Figure 41. By 1916 Waasa and Embarrass Townships (in Survey Area Two) had significant agricultural settlement; T59N, R13W (in Survey Area One) remained unincorporated and land was in primarily corporate ownership. (Hixson 1916)

According to census records, most of Waasa's first Euro-American settlers arrived in the United States between ca. 1890 and 1910 (U.S. Census 1920, 1930). Their farm acreage typically ranged from 40 to 160 acres (Hixson 1916). In 1910, approximately 25 farm households in Waasa Township were employed almost exclusively in farming. By 1930, approximately the same number of farm households included persons employed in lumber and mining industries, as well as occupations such as public school teacher, merchant, and even a summer resort worker (Federal Census 1910, 1930). With poor transportation for market crops, most early farms would have been subsistence level, with sale of surplus to local lumber and mining businesses. Embarrass Township was organized in 1905; Waasa was incorporated in 1911. Van Brunt (1921) described Waasa as settled by "agriculturists primarily of Finnish origin . . . who perhaps are the pioneers best fitted to develop such territory" (van Brunt 1921:735-6). In 1920 Waasa's population numbered 318 (U.S. Census 1920; Figures 41, 42). Potatoes proved to be a reliable market crop and dairying supplied local cooperatives (Lamppa 1966).

In the mid-1950s a portion of the Erie Mining Company Tailings Basin was constructed at the southern edge of Waasa Township. Remaining property types in the areas not impacted by mining include farmsteads (or ruins of farm buildings and foundations) and field patterns and fences.

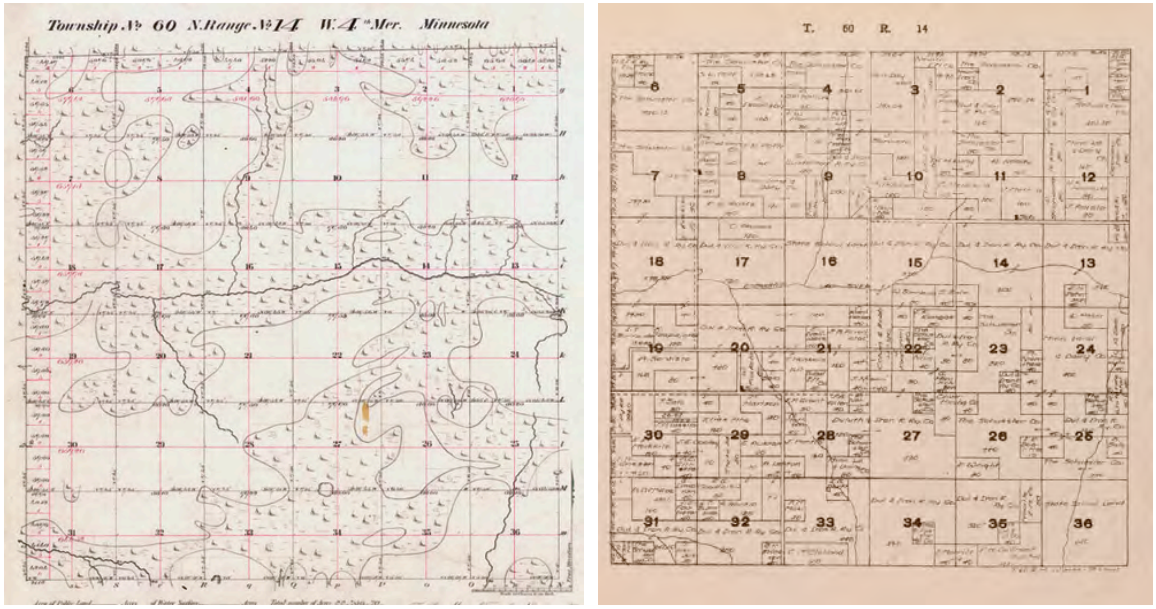

Figure 42. Township maps from 1876 (left, Surveyor General) and 1916 (right, Hixson) illustrate agricultural land division after permanent white settlement in Waasa (Survey Area Two). South of the Embarrass River, which includes Survey Area Two, 40- to 160-acre farmsteads contrast with larger tracts owned by mining, lumber, and railroad firms.

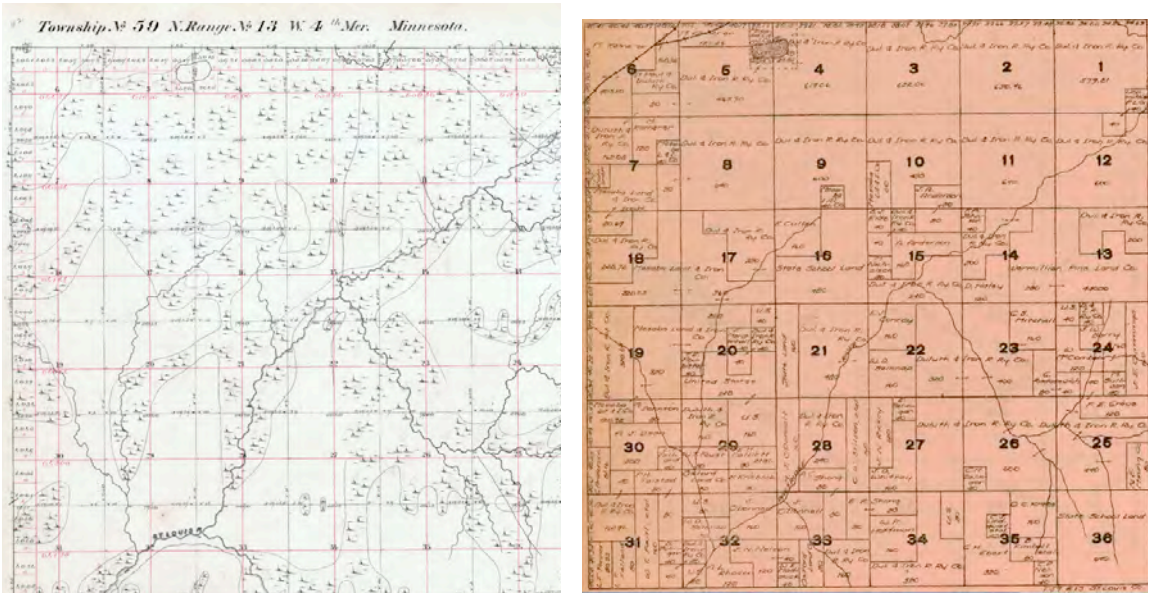

Figure 43. Township maps from 1876 (left, Surveyor General) and 1916 (right, Hixson) illustrate agricultural land division after permanent white settlement along the Partridge River in T59N, R13W (portions of Survey Area One). Segments of two Indian trails are shown at left on the 1876 map in Sections 1, 10, 15 and 36.

3.2.20 Mining Landscapes

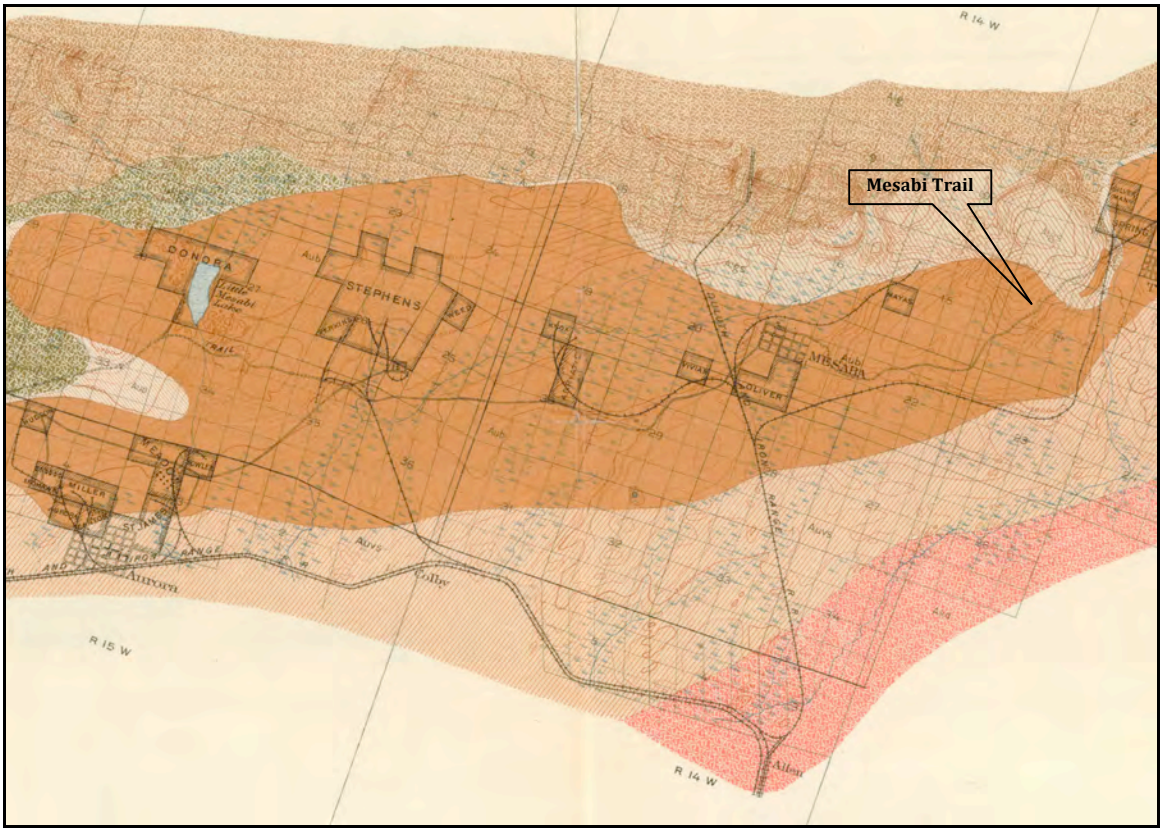

Figure 44. Natural ore mines in R14W and R15W (Leith 1909).

Mines and related mining property types occupy large areas of portions of the APE. In many cases mining activity has extensively altered or eradicated features associated with Pre-Contact and Contact-Period landscapes. Although mining has often completely transformed the landscape, the Spring Mine (opened 1906) in Section 11 of T59, R14W is at the edge of a sugarbush documented as being used by Ojibwe as recently as the 1940s (Crowell and Murray 1911:176; Latady and Isham 2011:4; Appendix Section 6.5.1). Today's Spring Mine Lake is the water-filled pit.

Mining properties include those associated with early Mesabi range exploration, townsites and mining locations, early natural ore mines, taconite mines, stockpiles, tailings basins, haul roads, railroads, drainage ditches, and power corridors (Map 19). T59N, R13W; T59N, R14W; and T59N, R15W (east of Survey Area One and south of Survey Area Two), for example, encompass a series of natural ore mines opened after 1903 that were later incorporated into the expansion of Erie Mining Company's extensive taconite operation during the 1950s (Map 19; Figure 44).

NRHP Bulletin 42, *Guidelines for Identifying, Evaluating, and Registering Historic Mining Sites* (Noble and Spude 1997) provides a background for evaluation of mining landscapes. The bulletin and related background research suggest how natural ore and taconite mining is represented by the system of ore pits, stockpiles, roads, railroads, and the water and power supply that comprise portions of Survey Area One and the larger APE. Previously inventoried mines and mining properties within the APE are shown on Tables 1-3 and Map 4.

3.2.20.1 Mesaba Townsite

Some of the earliest exploration of the Mesabi iron range took place in T59N, R14W, which is located within the central portion of the APE. The north-south route of the D&IR was laid between Duluth and Tower in 1884, and in 1888 mining surveyor John Mallman investigated the area around the "Red Pan Cut" of the railroad near the future Mesaba townsite in Section 28, T59N, R14W (Zellie 2005:2-32). The first diamond drill site on the iron range is located northwest of the Area 2WX Pit in Section 33, T59N, R14W. It was developed in 1890 by E. J. Longyear (NRHP; SL-HLC-001). The Mesaba townsite was formally platted in 1891, when it had a population of about 200 (Van Brunt 1921:704). It was located in Section 21, T59N, R14W and was briefly a center of trade for the first mining as well as lumbering activity on the eastern Mesabi (Van Brunt 1921:702). Nearby mines had poor yields, however, and mining interest shifted to the west to higher-grade deposits at Mountain Iron and Biwabik. With a few exceptions, the Oliver Mining Company "pulled out of investments in the Mesaba area mines" after World War I, and after several boom and bust cycles, the corporate structure of Mesaba village was dissolved in 1947 (Lamppa 1962:51; Zellie 2005:3-44). No buildings or structures remain.

3.2.20.2 Aurora

Ore was discovered near present-day Aurora in the southern portion of the APE in 1898 at the Meadow Mine, but further mine exploration and development did not occur until after 1903 (Aurora Journal 3 July 1958:3). The first townsite of Aurora was founded in ca. 1903 near the Meadow Mine (Walker 1979:214). In 1905 a new townsite was chosen because it was closer to the DM&IR route. The relocated community had steady growth near the Stephens, Meadow-Fowler, and other mines (Aurora Journal 3 July 1958:3; Hoyt Lakes News 9 March 1960:5). Most of the Aurora-area mines are in White Township, which was organized in 1906 (Hoyt Lakes News 9 March 1960:5). Aurora's population peaked at about 2,800 in 1920 and further declined during the Depression of the 1930s. In 2000 it was 1,850 (Zellie 2005:33). The re-opening of the Stephens Mine and the opening of the Erie Mining Company's taconite plant at Hoyt Lakes, both in 1957, provided a local economic boom.

3.2.20.3 Natural-Ore Mines in the Aurora-Mesaba Area

Natural-ore mines noted in this section are shown on Map 19. The first mines opened between Mesaba and Aurora included the Stephens (1903), a large open pit operated in Section 26, T59N, R15W by the Oliver Iron Mining Company. The area's natural ore mines were mined by underground as well as open pit methods but were not developed until about ten years after ore shipment began to the west at the Mountain Iron and other mines. Several natural ore mines, including the Stephens, were inactive for decades after their initial early 20th-century operation. Reactivation of the Stephens Mine in 1957 was the first step in creation of a small natural-ore mining district that reached from the Donora Mine at the west to the Knox Mine at the east. Now expanded and filled with water, the mine pits are edged with stripping, lean ore, and waste rock stockpiles of various descriptions. Portions of concrete slabs remain in a few locations, likely remnants of loading pockets and plant structures.

3.2.20.3.1 Spring Mine

The Donora to Knox-area mines discussed below are part of the APE. The Spring Mine noted in is located in Survey Area One in Section 11 of T59N, R14W. This natural ore mine was opened in 1906 and produced a soft, gray Bessemer hematite. It was inactive after 1910 (Van Brunt

1921:706). Ore was shipped on the D&IR to Two Harbors (Crowell and Murray 1914:15). The water-filled pit is now labeled as Spring Mine Lake on USGS maps.

3.2.20.3.2 Stephens Mine

The Stephens Mine ore deposit has been described as unique among the deposits of the eastern Mesabi iron range because it was a broad, shallow "blanket" type. The deposit was about 70 to 80 feet thick and was covered by approximately 20 to 30 feet of overburden (Aurora Journal 3 July 1958:10). The mine incorporates two eras of development between 1899 and 1991, spanning from its initial operation by the Oliver Iron Mining Company to that by LTV Steel. The water-filled Stephens Mine was explored in Section 26 of T59N, R15W and acquired by Henry and Albert L. Stephens of Detroit, Michigan. In 1899, the Stephens brothers leased the property to the Oliver Iron Mining Company (Aurora Journal 3 July 1958:10). Oliver operated the mine 1903-1905. In 1957 the Oliver Iron Mining Company (since 1901 controlled by the U. S. Steel Corporation) reopened the mine. At the time, the Stephens was the "largest undeveloped reserve of direct shipping ore on the Mesabi Iron Range." In 1983, LTV Steel's Northwest Ore Division leased the remaining portion of the Stephens Mine from U.S. Steel. One historian notes, "when operations ceased at the Donora and Stephens mines on the eastern Range on September 6, 1991, it was believed to mark the first time in over 100 years that no natural ore would be extracted from the ground of Northern Minnesota" (Leopard 2005:113).

3.2.20.3.3 Donora Mine

In ca. 1903 the Oliver Iron Mining Company established the Donora Mine in sections 27 and 28, T59N, R15W (Leith 1909; University of Minnesota 1954:78). The mine was opened in the bottom of Mesaba Lake. Shipments from the Donora Reserve began after 1921 (Van Brunt 1921:485-86). Beginning in the early 1970s the Donora was operated in conjunction with the Stephens, where mining ended in 1991. The much-larger LTVSMC Area 9 Pit includes the Donora Mine.

3.2.20.3.4 Pacific Mine

The Pacific Mine was operated by the Pacific Isle Mining Company. It was opened in 1937 in sections 23 and 24, T59N, R15W to the north and northwest of the Stephens. It operated until 1958 when shipments totaled 479, 299 tons (D. N. Skillings 1994:61).

3.2.20.3.5 Perkins Mine

The Perkins Mine in Section 26, T59N, R15W was opened in 1909 by the Perkins Mining Company. A total of 612, 890 tons were shipped by 1919 and the mine was exhausted by 1920 (Leith 1909; Crowell and Murray 1920:153). The Charleson Mining Company opened the adjacent Perkins Annex in 1941 (University of Minnesota 1954:161). The Perkins and Perkins Annex are southwest of the Stephens Mine.

3.2.20.3.6 Weed Mine

The Oliver Iron Mining Company opened the Weed Mine in Section 25, T59N, R15W as an underground mine in 1914 (Figures 2, 4). 320, 575 tons were shipped from the Weed by 1919 and it was exhausted by 1920 (Crowell and Murray 1920:173; University of Minnesota 1954:198).

3.2.20.3.7 Knox Mine

The Knox Mine is located to the east of the Stephens Mine in sections 19 and 30, T59N, R14W. It was explored in 1903 and was opened as an open-pit mine in 1909, yielding a soft, red non-Bessemer hematite (Leith 1909; Crowell and Murray 1914:121-122). The mine was operated until 1986 (D. N. Skillings 1994:56).

3.2.20.3.8 Adriatic Mine

The Adriatic Mine in Section 30, T59N, R14W was explored in 1901-02 and was opened in 1906 by the Adriatic Mining Company of Cleveland, Ohio as an underground mine. It was operated until 1918 (University of Minnesota 1951:47). The Adriatic has been absorbed by the Area 2WX pit and stockpile.

3.2.20.3.9 Vivian Mine

The Vivian Mine in Section 20, T59N, R14W was opened as an underground mine in 1912 by the Northern Pacific Railroad Company (Van Brunt 1921:706). The pit was backfilled by LTVSMC after 1986.

3.2.20.4 Early Development of Taconite Technology

The taconite pellet production process transforms crude taconite ore into a fine powder through a wet or dry process, and then into a concentrate that is magnetically separated and formed into pellets before placement in a furnace where magnetite is converted to hematite (Witzig 1959:74). Experimentation with methods of extracting higher-grade ore from taconite began in Minnesota in 1913 at the University of Minnesota's Mines Experiment Station. Efforts to test commercial methods of production in Minnesota began in 1919, when the Mesabi Iron Company developed the Mesabi Iron Company Magnetic Concentration Plant at Babbitt that used ore from the Sulphur Mine near Mesaba. The plant closed in 1924 but was refurbished and operated by the Reserve Mining Company as a test plant between 1952 and 1957. The Mesabi Iron Company facility is regarded as the first commercial-scale taconite processing plant in Minnesota (Roberts 1987:8.2). U. S. Steel opened the Pilotac Plant near Mountain Iron in 1953 (Davis 1964:142-3; EMJ Dec 1956:77).

3.2.20.5 Pickands Mather & Company

In 1940, Pickands Mather & Company of Cleveland, Ohio, in partnership with four Cleveland steel companies (Bethlehem Steel Corporation; The Youngstown Steel Company; Interlake Iron Corporation, and The Steel Company of Canada), created the Erie Mining Company to develop and implement technologies for extracting and processing low-grade iron ore (Witzig 1959:84; SMR 7 November 1959:5). In 1942 the Erie Mining Company established a laboratory in Hibbing to experiment with concentration and agglomeration techniques (EMJ 1955:89).
In 1948 the Erie Mining Company built a now-razed experimental plant north of Aurora in Section 28, T59N, R15W. Known as the Preliminary Plant or "pre-tac," its purpose was to evaluate commercial processing and pelletizing methods developed at the University, "testing the flowsheet worked out in the laboratory on commercial-sized equipment" (Erie Mining Co. 1969:3).

3.2.20.6 Erie Mining Company

Figure 45. Erie Mining Company Concentrator Building Construction, ca. 1954.

At the time of its opening in 1957, the Erie Mining Company's Hoyt Lakes plant was the state's second large-scale commercial taconite plant. In operation between 1957 and 2001, the plant was exemplary of the planning, plant design, and manufacturing processes that characterized the Mesabi iron range taconite industry after World War II. At Erie, as at other early plants, the crushing, grinding, magnetic separation and pelletization requirements of taconite production demanded engineering of completely new or varied procedures to introduce power, acquire and control a water supply, and create methods of transportation and waste disposal. This was in addition to the construction of communities to house a new labor force (Witzig 1959:91-92).

The construction of the Hoyt Lakes taconite plant under the management of Pickands Mather & Company followed years of experimentation with methods for commercial taconite production from the enormous reserves of the Biwabik formation of the eastern Mesabi iron range (Figure 45). Described as "the largest single iron ore mining project and one of the biggest private construction projects ever undertaken" (Iron News, June 1957:3), Erie was one of two firms leading investment in commercial taconite production. The E. W. Davis Works at Reserve Mining Company (now Northshore Mining Company) began pellet production in 1955, and Erie (later LTVSMC) began production in 1957 (Iron News, June 1957:3). Reserve's ore was mined at Babbitt and shipped 47 miles to the Silver Bay plant for concentration and shipment. At Erie, a single plant at Hoyt Lakes carried out all of the crushing, concentrating, and agglomerating processes.

In 1969, fueled by the 1964 Minnesota Taconite Amendment, Erie achieved an annual pellet output of 10.3 million tons. With the addition of three new plants—the Fairlane Plant of Eveleth Taconite Company (1965), Butler Pellet Company Plant at Cooley (1967), and the National Steel Pellet Company Plant at Keewatin (1967)—Minnesota's iron ore production reached a total of 24

million tons in 1967. Minnesota's taconite production peaked in the early 1980s before entering a period of decline. International economic, political, and technical factors accompanied the decline. Technical factors included ore reserves, transport and fuel costs, taxes, and plant design.

Erie Mining Company was acquired by LTV Steel Corporation in 1986 and renamed LTV Steel Mining Company (LTCSMC). Management was provided by Cleveland Cliffs Inc. LTV Steel Corporation and its LTVSMC subsidiary entered bankruptcy in 2000, and the plant closed in early 2001. In October 2001 LTV Steel Corporation sold the LTVSMC plant, mines, railroad and appurtenances to Cliffs Erie. In 2003 PolyMet and Cliffs Erie entered an option agreement for portions of the plant, tailings basin, mining equipment service facility, and water and rail system usage.

In December 2007 Steel Dynamics, Inc. purchased approximately 6,000 acres from Cliffs Erie. With Kobe Steel, Ltd. they formed a new corporation, Mesabi Nugget Delaware, LLC, to construct and operate an iron nugget manufacturing plant on the site (Steel Dynamics 2007). Steel Dynamics, Inc. also formed Mesabi Mining LLC to mine taconite and produce concentrate for use in the nugget operation and for sale.

In 2006, 98 percent of the usable iron ore produced in the United States was shipped from Minnesota and Michigan taconite operations, with Minnesota accounting for about 75 percent of total shipments. By 2007 there were ten iron ore open pit mines, eight concentration plants and eight pelletizing plants, with eight of the mines operated by three companies. Cleveland Cliffs, U. S. Steel and Mittal Steel USA accounted for more than 99 percent of production (Mining Magazine April 2007:14).

3.2.20.5.1 Erie Mining Company Mine Area No. 1 (SL-HLC-019)

Mine Area No. 1 in Sections 13 and 21-24 of T59N, R15W was opened in 40-foot benches with drill holes spaced about 20 feet apart (EMJ 1955:91). These areas were quite long as compared with an ordinary open pit mine. By 1959 Mine Area No. 1 extended to the west to the east half of Section 23 of T59N, R15W. The nearly six-mile-long open pit and associated stockpiles now extend across Sections 18-19, T59N, R14W, and sections 21-24 and 27-28, T59N, R15W. The ore was loaded from the pit to rail cars and transported to the coarse crusher at the Erie plant in nearby Section 9, T59N, R15W and processed to produce taconite pellets. The pellets were then shipped 74 miles on the Erie Mining Company Railroad to Erie's shipping facility at Taconite Harbor. Mine track for transporting ore from the mine to the plant followed the course of pit expansion and by the late 1960s was extended to Mine Areas 6 and 9 (Erie Mining Company [EMC] 1969b).

3.2.20.5.2 LTVSMC Area 6 Pit

Between 1965 to early 2001, Area 6 in Section 35, T59N, R15W was mined by LTV Steel Mining Company as a natural ore mine and then as a taconite mine (Buell 2008). The pit was mined over the route of the Mesabi Trail / County Highway 26 (SL-HLC-026), which was abandoned by the 1970s.

3.2.20.5.3 LTVSMC Area 2WX

Area 2WX in sections 29 and 30, T59N, R114W was the last mine pit developed by LTVSMC. Stripping of Area 2WX began in 1980 and ore was produced from 1987 to 2001 (Buell 2008). As

with the other taconite pits, the 2WX pit is now filled with water. The development of the 2WX taconite operation resulted in filling of the former Vivian Mine pit (3.2.20.3.9).

Figure 46. LTV (former Erie Mining Company) Taconite Tailings Basin in sections 32, 33 and 34, T60N, R14W, looking west along the north edge of the basin, 10/13/2010. Barr photo.

3.2.20.7 Peter Mitchell Mine

The open-pit Peter Mitchell Mine is located in portions of T59N, R60W, and T61N, R12W and 13W. The mine was opened as a natural-ore operation in 1918 as the East Mesabi Mine by the Mesabi Iron Company. The Reserve Mining Company operated it after 1924 as the Reserve Mine, and after 1957 as the Peter Mitchell Mine, a taconite operation (University of Minnesota 1968:131).

4.0 RESULTS

4.1 Study Overview

The Bois Forte, Fond du Lac, Grand Portage and Bad River Bands have emphasized the importance of natural resources to their people, stating that the resources play an integral role in their society and culture including spiritual practices. As required by the Corps and with the collaboration of the Consulting Bands, the objective of this study is the identification of historic properties of spiritual and cultural significance.

As described in Section 1.0, the study is focused on the areas identified by the Corps as Survey Area One and Area Two (Maps 1-2). The results of Band elder interviews and plant surveys are referenced throughout the historic contexts discussed in Section 3.0. The interviews and surveys provide information about the potential location and significance of specific features related to many aspects of traditional Ojibwe culture.

Maps 1-21 and Figures 1-46 show how a diverse collection of information about the landscape was mapped and analyzed. Extensive areas across the APE (Maps 1-2), including portions of Survey Area One and Area Two, have been highly disturbed by activities such as logging, mining, and agriculture, as well as community development and road construction.

As shown on Map 21, however, other undisturbed areas are framed by the viewshed of *Missabe Widjiw*—the Laurentian Divide—and possesses spiritual and cultural significance. The survey areas are also framed by the Embarrass and Partridge Rivers that provided water routes and wild rice, fish, plants and wildlife for native people. A network of Indian trail corridors that linked Lake Vermilion and Lake Superior extends across both survey areas (Section 3.2.12). The route delineated by Trygg in sections 1, 2, and 12 of T59N, R13W and in Section 35 of T60N, R13W represents a corridor that likely contained a various summer and winter trails. A well-visited sugarbush site at Spring Mine Lake is located south of the intersection of two trails in Section 3 of T59N, R14W, and a granite outcrop and overlook are situated to the north of the intersection (Map 21; sections 3.2.10; 3.2.11).

As discussed in Sections 3.2.8 through 3.2.10 and elsewhere, Bois Forte Band elders have identified the cultural and spiritual significance of wild rice, sugar maple, and many other types of plants. Maps 17, 18, and 20 show the locations of plant and wild rice surveys, and study results are discussed in Section 3.0 and further detailed in Appendix sections 6.1-6.3. The viewshed of *Missabe Widjiw*, a landform of spiritual significance to the Ojibwe, is the backdrop of the APE. As discussed in 3.2.11, the overlook at the intersection of the New Indian and Vermilion-to-Beaver Bay trails is is representative of sites important for their spiritual power. The overlook also contains a collection of oaks and plants important to Ojibwe. Table 6 shows five properties encompassing three property types that were identified and evaluated in the study (Map 21).

Table 6. Cultural Landscape Study: Identified Properties (see Map 21)

MNSHPO Inventory	Property Name	Location	Recommendation
SL-HLC-015	*Missabe Widjiw* Viewshed at Overlook	As viewed from Overlook in Section 3 of T59N, R14W	Potentially NRHP eligible
SL-HLC-016	Overlook in Section 3 of T59N, R14W	SW 1/4 of NE 1/4 of NE 1/4, Section 3, T59N, R14W	Potentially NRHP eligible
SL-HLC-017	Spring Mine Lake Sugarbush	Section 11, T59N, R14W	Potentially NRHP eligible
SL-HLC-018	Indian Trail Intersection: "Indian Trail from Lake Vermilion to Beaver Bay," and "New Indian Trail"	SW 1/4 of NE 1/4 of NE 1/4, Section 3, T59N, R14W	Potentially NRHP eligible
SL-HLC-019	"Indian Trail from Lake Vermilion to Beaver Bay" Corridor	Sections 1, 2, and 12 of T59N, R13W and Section 35 of T60N, R13W	Potentially NRHP eligible

4.2 Recommendations:
Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing

The NRHP eligibility criteria (Section 1.3.3) can be applied to each of these identified properties and each may be further evaluated as a Historic Property of Religious (Spiritual) and Cultural Significance to Indian Tribes (Section 1.3.2). Information is provided by NPS Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King, rev. 1998); Bulletin 16b, *How to Complete the National Register Multiple Property Documentation Form* (Lee and McClelland, rev. 1999), and *Consultation with Indian Tribes in the Section 106 Review Process: A Handbook* (ACHP 2008). As discussed in 1.3.2, although there are similarities with Traditional Cultural Properties, the ACHP notes that within the Section 106 process, the appropriate terminology for sites of importance to Indian tribes is **"historic property of religious and cultural significance to an Indian tribe**" (ACHP 2008:19). This description appears in NHPA and Section 106 regulations and applies strictly to tribal sites (ACHP 2008:19).

Bulletin 38 provides guidance on determining eligibility and application of NRHP Criteria (Section 1.3.3). The properties meeting NRHP criterion for significance and recommended as potentially eligible for listing in the NRHP appear to be suitable for a Multiple Property Listing (MPL; Map 21). See Appendix Section 6.10 for inventory/evaluation forms for each identified property.

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6.0 APPENDIX

6.1 Plant Survey Methods

Vegetation surveys were conducted between May and October 2010 to gather data on the distribution and relative abundance of native plant communities and plant species that have traditional cultural uses among the Great Lakes Ojibwe Bands. The surveys were conducted within a study area comprising the proposed NorthMet mining and tailings basin sites. This study was part of a collaborative effort among PolyMet, the Corps, Barr, Landscape Research LLC, and the Fond du Lac, Grand Portage and Bois Forte Bands of Chippewa. The purpose of the surveys was to evaluate the degree to which the study area provides opportunities to gather a variety of plant species for use in traditional Ojibwe cultural practices. This representative evaluation enables a broader characterization of similar traditional vegetation-gathering opportunities within the watershed and in the region.

Initial Work

The initial study of GLO field books for T59N, R13W and T60N, R14W produced a detailed list of vegetation, terrain and other features encountered by the government surveyor during September and October 1872 and September and October 1882.

The survey of these two townships suggested there was a high correspondence between the trails shown on the Trygg Map (1966:17), GLO surveyors' field notes, and the GLO township survey maps, which were based on the field notes. Only one portage segment was noted in the field books, and was located outside the APE in T60N, R15W.

Although there were few major surprises in the field books for T59N, R13W and T60N, R14W, they provided a useful account of trees, lower-story undergrowth, and terrain, as well as information about the potential proximity of noted trails to trees, tree and shrub undergrowth, and landscape features (swampy areas, general soil notes, trails, etc). There were only a few instances of trails mentioned that are not shown on the Trygg Map. Various spellings of place names provided by the surveyor, such as Mesaba Heights, are also of interest (Table 5; 6.7).

The locations of trails and other features noted in the survey notes were mapped for T59N, R12-14W and T60N, R15W in anticipation of fieldwork on June 9-10, 2010 and combined with the trails and encampment area identified on the GLO and Trygg maps (Figures 26 and 27). The intersection of the New Indian Trail and the Vermilion-Beaver Bay Trail, the adjacent granite ledges and outcrops, and oak stands were located during the June 9-10 fieldwork.

6.1.2 Vegetation Distribution/Abundance Methods

The evaluation of the distribution and abundance of plant species in the study area was based on the compilation of detailed species composition and cover data from representative Minnesota Department of Natural Resources (MNDNR) Ecological Classification System (ECS) community types in the study area, and the extrapolation of that information onto existing MNDNR mapping of ECS communities in the study area.

Vegetation data collection began in May 2010 and was completed in October 2010. In all, five visits were made to the study area, in May, June, August, September and October 2010. Initially, vegetation data collection was a collaborative effort between Barr, representative(s) of the Ojibwe bands and Deb Pomroy, the consulting botanist designated by the Bands to assist in the surveys. Data from nine

vegetation plots were collected in May. Prior to the June visit, the focus of the work shifted toward describing vegetation communities adjacent to historic trails and other sites of historic/cultural significance. For the June and most subsequent visits, Barr botanists worked separately from Deb Pomroy and the Band representatives.

Vegetation plots for this survey were adapted from MNDNR relevé methods. A circular plot approximately 50 feet (15 meters, ~0.2 acre) was established. Botanists attempted to locate and identify all plant species within this plot area. Each plant species identified was assigned a stratum and a relative cover value. General strata were as follows: tree, shrub, herb/grass and vine. The tree stratum was further divided into emergent/overtopping, canopy and subcanopy. The shrub stratum was divided into high shrub and low shrub. An individual plant species could be placed in as many of the sub-strata as applicable. Total cover for each sub-stratum was evaluated and recorded. In addition, percent cover of sphagnum and non-sphagnum mosses was recorded.

Relative cover was based on Braun-Blanquet cover values, where each plant species in each sub-stratum is assigned a value of 1 to 5, with corresponding percent cover as follows:

- 1 = <5%
- 2 = 5-25%
- 3 = 25-50%
- 4 = 50-75%
- 5 = >75%

Where only a single individual of a plant species was found, the cover value was recorded as "t", meaning trace cover, which was assigned a cover value of 0 in the data analysis.

All vegetation plots were classified following the ECS types found in the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MNDNR, 2003). ECS communities were originally determined to the native plant community (NPC) class level (e.g., FDn32) for each plot. However, analysis of the plot data was conducted at the next level up, which is the ecological system – floristic region level (e.g.; FDn, where "FD" indicates the "Fire Dependent" ecological system and "n" refers to northern Minnesota). Analysis of the vegetation data at this level provides a broader overview of the distribution and abundance of plant species in the study area. Moreover, the ECS ecological system level of classification is more consistent with the classification system in the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) *Plants Used by the Great Lakes Ojibwa* (Meeker et al., 1993). All vegetation plots were also assigned the appropriate GLIFWC classification.

All plot data was entered into an Access database. Queries were made to the database to determine the following:

- Species identified
- Number of plots in which each species found
- Average percent cover of each species
- Average species abundance by ECS community
- Species occurrence by ECS community
- Sphagnum and bryophyte cover by community type

6.1.3 Specific Landscape Element Vegetation Methods

Barr staff also searched the study area for landscape features that would potentially have value in Ojibwa history and traditional culture. These included maple sugar production areas, promontories or scenic overlooks, and trails.

6.1.3.1 Sugar Maple Site (Sugarbush)

PolyMet staff informed the members of the study team that an old maple sugar production area (sugarbush) was located southeast of the tailings basin (Map 14). Barr staff, as well as other participants in the overall study, visited the sugarbush site in June, July and August 2010. Barr biologists installed a total of three data plots, as described above, in and around the sugarbush site. Deb Pomroy installed a total of five vegetation plots in the immediate vicinity of the sugarbush. See Section 3.2.10.1-2 for description of the sugarbush site.

6.1.3.2 Promontories (the Overlook)

Promontories on the landscape were identified in the field, where possible, and by reviewing topographic maps. The most obvious promontory in the area is the overlook along the northeast edge of the tailings basin (Map 21). The overlook has young regenerating growth of aspen dominating the lower two-thirds of its slopes. However, the upper third of the slope and the top of the overlook are dominated by a variety of older native plant communities and exposed rock outcrops. The Trygg map shows two trails – one heading upslope from the south and one traversing cross-slope from the east – converging and heading roughly northwest from a point near the top of the overlook (Figure 9).

Barr staff ascended the south slope of the overlook to investigate the vegetation communities and rock outcrops. Where unique vegetation communities were encountered, a standard vegetation plot (as described above) was installed. At each rock outcrop that was encountered, a list of vegetation in and around the outcrop was compiled, photos characterizing the view were taken, and a compass was used to record the approximate directional perspective available from the outcrop. See Section 3.2.11.1 for a description of the overlook site.

6.1.3.3 Trails

Locations of trails used for traversing the area are shown on the 1966 Trygg Map, which in turn are based on late 19th-century General Land Survey maps and notes (Maps 9, 14,15). In order to locate these trails and characterize vegetation communities adjacent to the trails, the map was digitized into GIS shapefiles and loaded onto Trimble GPS units. Barr staff and the other participants in the study used the digitized Trygg trails on the Trimble GPS unit to conduct meandering traverses across the mapped trail locations, searching for evidence of actual trails. Vegetation data were collected at several locations near the vicinity of the mapped trails. See Section 3.2.12.1 for a description of the vegetation communities along the trails.

6.2 Vegetation Survey Results

6.2.1 General Vegetation Distribution and Abundance in the Study Area

Over 152 plant species were identified, in seven distinct ECS plant community types (Tables 7 and 8). Five plant species were identified in at least half of the 43 plots, and another 21 plant species were identified in at least one-quarter of the plots. However, nearly three-quarters of the plant species identified occurred in five or fewer plots. Also, most plant species identified were present in relatively low percent cover, regardless of the number of plots in which they were found.

Balsam fir (*Abies balsamifera*) was the most frequently-encountered species, occurring in 29 plots, and in five of the seven ECS communities identified. Black spruce (*Picea mariana*), bigleaf aster (*Eurybia macrophyllus*), bunchberry dogwood (*Cornus canadensis*) and Canada mayflower (*Maianthemum canadense*) are also common throughout the study area, each occurring in at least 20 plots. Three plant

species were found in five of the even ECS community types including balsam fir (*Abies balsamifera*), speckled alder (*Alnus incana*) and low-bush blueberry (*Vaccinium angustifolium*).

Native plant communities ranging from drier upland types to acidic peatlands and marshes are more or less evenly distributed in a mosaic across the study areas. Survey Area Two has more wetland vegetation communities than Survey Area One. No managed or artificial pattern of vegetation communities can be discerned within the two study areas, with the exception of the sugarbush site and logged areas (Maps 17,18).

While the vegetation communities identified are dominated by native species, there is nevertheless some degree of natural and/or human disturbance throughout the study area (see Section 3.2.3). Generally speaking, however, there is a diverse assemblage of plant species and plant communities distributed across the study area. This diversity provides opportunities for the gathering of a number of plant species (at least 152), all of which have some level of utility in traditional cultural practices.

Extending the findings from the study area to the APE, there appears to be no significant difference in vegetation communities between the Survey Areas and the overall APE. The same 152 plant species and seven ECS community types identified in the study areas are likely present within the APE.

6.2.2 Sugar Maple Site (Sugarbush)

The sugarbush site shows strong evidence of management that has altered the natural vegetation community. Based on vegetation data plots within and adjacent to the sugarbush, the natural vegetation community is rich maple-basswood forest. This community type in its natural state should have approximately 35 percent sugar maple cover, and 10-25 percent basswood, as well as some yellow birch (reference). However, the sugarbush site has more than 75 percent sugar maple cover, less than 5 percent basswood and less than 1 percent yellow birch. This suggests that the sugarbush site was managed to increase sugar maple cover by excluding and/or eliminating non-maple tree species. Further evidence of long-term use and management of the site as a maple-sugaring facility is the damage evident on many of the trunks of older maples. Trunks on these trees are flattened at about 4 to 8 feet above the ground surface, with visible interior decay on many of the damaged trees. The likely explanation for this damage is the long-term effect of repeated tapping of the trunk for sap collection.

6.2.3 Promontories (Overlook)

While the lower slopes of the overlook are unremarkable aspen-birch regeneration, the upper slopes have several interesting features that may provide evidence of past Ojibwe cultural use of the overlook. These features are described in detail in Section 3.2.11 and in Appendix 6.1.3.2 and 6.3.4 (Cover, Figures 18-21). They include two small stands of red and pin oak, scattered individuals and small groups of sugar maple, and several remnant mature white pines. Based on the 2010 vegetation survey data and on past botanical studies on the NorthMet Mine Site, the occurrence of maple and oak is exceptional. There are no previous documented locations of oak on the NorthMet site in the botanical studies conducted for the Project. Vegetation plots around the sugarbush are the only documented locations of sugar maple-dominated communities.

While there is no proof that the oak and maple have been planted, the apparent absence of these species elsewhere suggests that Ojibwa use of the overlook is somehow associated with these species being present.

The remnant pines may be the progeny of white pines cut up to 100 years ago. Without age data (obtained by coring the trees), it is uncertain how old they were if and when white pine was harvested in the area.

Another interesting feature on the overlook is a rock outcrop approximately 40 by 25 feet in size near the point where the Trygg Map indicates an intersection of the "New Indian" and Vermilion-to-Beaver Bay trails. Furthermore, a series of rock outcrops wrapping around the south and west faces of the upper slopes of the overlook correlate closely with the trail route shown on the Trygg Map. These rock outcrops provide a series of west- and south-facing perspectives as one travels south around to the south slope of the overlook. At the top of the overlook is a broad bare rock area with views to the east.

Collectively, the vegetation and geological features on the upper slopes of the overlook provide strong circumstantial evidence of past Native American use of the site.

6.2.3 Trails

There is no apparent correlation between the trails shown on the Trygg Map and the distribution of vegetation communities. In other words, vegetation does not appear to have been managed along trails. For the most part, trails as they appear on the Trygg Map seem to be designed to stay in uplands and avoid wet areas.

Table 7. Vegetation Data Plot Plant Species Identified During NorthMet Cultural Landscape Study (listed by Scientific Name)

Each of the following plant species was recorded on at least one of the 43 vegetation data plots that were installed as part of the Cultural Landscape Study. The species listed are only those that were found on a vegetation data plot. Many other plant species are present within the study area, but were not recorded on one of the 43 vegetation data plots (Maps 17, 18).

The table provides the scientific name, the common name and the Ojibwe name (where available) for each species. Ojibwe names were obtained from *Plants Used by the Great Lakes Ojibwa* (Meeker et al. 1993). In cases where a plant on a vegetation data plot was identified only to genus, the Ojibwa names are given for several species within that genus. This does not imply that all of the species within that genus were identified on the vegetation data plots.

Scientific Name	Common Name	Ojibwa Name
Abies balsamifera	Balsam fir	aninaandag, ininaandag, bigiwaandag, zhingob, zhingobaandag, zhingob bigiwaandag
Acer rubrum	Red maple	zhiishiigimewanzh, zhiishiigimiiwanzh
Acer saccharum	Sugar maple	aninaatig, -oog; ininaatig, -oog; sinaamizh; adjagobi'min
Acer spicatum	Mountain maple	zhaashaagobiimag
Achillea millefolium	Common yarrow	ajidamoowaanow, waabigwan
Actaea rubra	Red baneberry	ojiibikens, waashkobijiibikak, wiishkbobijiibik
Agrostis hyemalis	Tickle grass	
Alnus incana	Speckled alder	wadoop, wadoopiin
Amelanchier sanguinea	Serviceberry	gozigwaakominagaawanzh (plant); gozigwaakomin (berry); ozagadigom, zazigaakominagaawamzh
Anaphalis margaritacea	Pearly everlasting	waabigwan, baasibagak
Anemone quinquefolia	Wood anemone	
Antennaria neglecta	Pussy-toes	gaagigebag
Aralia nudicaulis	Wild sarsaparilla	bebaamaabiig, okaaadaak, waaboozojiibik
Aralia racemosa	American spikenard	chi-okaadaak, nezhikewang, okaadaak
Arisaema triphylla	Jack-in-pulpit	zhaashaagomin
Asarum canadense	Wild ginger	namepin, agabwen
Aster sp.	Aster	wiiniziikens (*A. puniceus, A. nemoralis*); naskosi 'îcus (*A. cordifolius*)
Athyrium filix-femina	Lady fern	a'sawan, ana'ganuck, nokomi'skînun
Betula alleghaniensis	Yellow birch	wiinizik
Betula papyrifera	Paper birch	wiigwaas, wiiwaasaatig, wiiwaasi-mitig, wiiwaasimizh
Bidens sp.	Beggars ticks	
Botrychium virginianum	Rattlesnake fern	gîckênsîne' namukuk
Bromus sp.	Brome grass	

Scientific Name	Common Name	Ojibwa Name
Bolboschoenus fluviatilis	River bulrush	
Calamagrostis canadensis	Bluejoint	
Caltha palustris	Marsh marigold	ogitebag
Carex cf. arctata	Drooping woodland sedge	
Carex deweyana	Dewey's sedge	
Carex gracilima	Graceful sedge	
Carex intumescens	Greater bladder sedge	
Carex lacustris	Lake sedge	
Carex pennsylvanica	Pennsylvania sedge	
Carex sp.	sedge	
Carex stricta	Tussock sedge	
Carex trisperma	Three-fruited sedge	
Chamaedaphne calyculata	Leatherleaf	waabashkikiibag, mashkiigobagoons
Circaea alpina	Enchanter's nightshade	
Clematis cf. virginiana	Virgin's bower	
Clintonia borealis	Blue beadlily	(g)odotaagaans, adota'gons, gînose'wībug, ozawa tootaugauhnse
Comptonia peregrina	Sweet-fern	kba'agne-minš, gibaime'nuna'gwus
Coptis trifolia	Three-leaved gold-thread	ozaawaajiibik
Corallorhiza trifida	Northern coralroot	
Cornus canadensis	Bunchberry dogwood	ode'iminijiibik, zhakaagomin, zhaashaagominens
Cornus racemosa	Gray dogwood	miskwaabiimizh
Cornus sericea	Red-osier dogwood	miskoobimizh, miskwaabiimizh
Cornus sp.	Dogwood	
Corylus cornuta	Beaked hazelnut	bagaan (nut); bagaanimizh, bagaanens, bagaanaak (plant)
Cypripedium acaule	Stemless lady-slipper	makizin (?)
Danthonia sp.	Oat grass	
Diervilla lonicera	Bush honeysuckle	wežauškwagmik, osawa'skanet
Dryopteris carthusiana	Spinulose wood fern	
Dryopteris cristata	Crested shield fern	ana'ganuck
Eleocharis acicularis	Needle spike-rush	
Equisetum arvense	field horsetail	jasibonskok, aiankošing, gežibnusk
Equisetum hyemale	Scouring rush	gijib'inukson', giji'binusk
Equisetum pratense	Meadow horsetail	wiishkobijiibik
Equisetum sylvaticum	Wood horsetail	siba'muckun
Erigeron sp.	Fleabane daisy	nookwezigan (several species)
Eriophorum vaginatum	Tussock cottongrass	bîwee' ckînuk, mesadi' wackons
Eurybia macrophyllum	Bigleaf aster	migiziibag, migiziwibag. Namegosibag
Fragaria virginiana	Wild strawberry	ode'imin (berry), ode'iminijiibik (root)

Scientific Name	Common Name	Ojibwa Name
Fraxinus nigra	Black ash	aagimaak, wiisagaak
Galium trifidum	Three-lobed bedstraw	ojiibwe' owe' cuwun
Gaultheria hispidula	Creeping snowberry	waaboozobagoons, waaboozobanzh
Glyceria striata	Fowl manna grass	anagone' wuk
Goodyera tesselata	Tesselated rattlesnake-plantain	
Gymnocarpium dryopteris	Oak fern	
Hepatica americana	Round-lobed hepatica	animozid
Hieracium aurantiacum	Orange hawkweed	
Hieracium kalmii	Kalm's hawkweed	waabigwan
Hieracium scabrum	Yellow hakweed	
Juncus sp.	Rushes	(gi)chigamiiwashk (*J. tenuis*); pis-nakniskuns (*J. effusus*)
Kalmia porofolia	Bog-laurel	
Lactuca canadensis	Wild lettuce	odjici'gomĭn
Larix laricina	Tamarack	mashkiigwaatig, mu'ckigwa'tĭg, mŏsh'kīkiwa'dik, pskignatik
Lathyrus ochroleucus	Cream pea-vine	bagwajipin, baasibagak
Lathyrus venosus	Forest pea	mĭ'nĭsĭno'wuck
Ledum groenlandicum	Labrador tea	mashkiigobag, mahkiikaang, waabashkikiibag
Lichen	lichens	
Linnea borealis	Twinflower	neezhodaeyun
Lonicera canadensis	Fly honeysuckle	
Lonicera oblongifolia	Swamp fly honeysuckle	
Luzula acuminata	Hairy wood rush	
Lycopodium annotinum	Common club-moss	
Lycopodium clavatum	Running club-moss	
Lycopodium dendroideum	Tree club-moss	
Lycopodium lucidulum	Rock club-moss	
Lycopodium sp.	Club-mosses	
Lycopus sp.	Water horehound	aandegopin (*L. asper*);
Maianthemum canadense	Canada mayflower	agongosimin
Maianthemum trifolium	Three-leaved Solomon's seal	
Malaxis unifolia	Green adder's mouth	
Mitella nuda	Naked miterwort	
Moneses uniflora	One-flowered pyrola	
Onochlea sensibilis	Sensitive fern	a'nana'ganuck
Orthilia secunda	Side-bells pyrola	
Oryzopsis asperifolia	Rice grass	
Osmorhiza claytonii	Sweet cicely	ozagadigom
Osmunda claytoniana	Interrupted fern	

Scientific Name	Common Name	Ojibwa Name
Petasites frigidus	Coltsfoot	
Phalaris arundinacea	Reed canarygrass	
Phragmites australis	Common reed	aaboojigan
Picea glauca	White spruce	gaawaandag, gaawaandagwatig, mina'ig, wadab, zesegaandag
Picea mariana	Black spruce	gaagaagiwanzh, zesegaandag, zhingob, zhingob gaawaandag
Pinus banksiana	Jack pine	okikaandag, gîga' ndag
Pinus resinosa	Red/Norway pine	apakwanagemag, zhingobiins, zhingwaak
Pinus strobus	White pine	
Plantago major	Common plantain	ginebigowashk, ginebigwashk,omakakiibag
Platanthera sp.	Rein orchids	
Poa sp.	Bluegrass	
Polygala pauciflora	Fringed polygala	tikizidgeebikohnse
Populus balsamifera	Balsam poplar/Balm Gilead	azaadii, maanazaadii
Populus grandidentata	Bigtooth aspen	azaadi
Populus tremuloides	Quaking aspen	azaadi, azaadiins
Prunus virginiana	Chokecherry	asa/isaweminagaawanzh (plant); asa/isawemin (berry)
Pteridium aquilinum	Bracken fern	
Quercus ellipsoidalis	Pin oak	
Quercus rubra	Red oak	mashkode'miizhimiszh, mitigomizh, wiisagi-mitigomizh
Rhamnus alnifolia	Alder-leaf buckthorn	
Ribes glandulosum	Skunk currant	waaboozojiibik
Ribes sp.	Currants and gooseberries	kauwe-šabu-min, me'skwacabo'mînuk (*R. cynosbati*); amikomin (*R. americanum*); miishijiiminagaawanzh
Ribes triste	Swamp red current	miishijiiminagaawanzh, zhaaboomin, cigagwa'tĭgon
Rosa acicularis	Bristly rose	oginiiminagaawanzh, kenukafta-minš
Rubus idaeus	American red raspberry	miskominagaawanzh, miskwiminagaawanzh (plant); miskomin (-ag), miskwimin (-ag) (berry)
Rubus pubescens	Dwarf red raspberry	skižgu-min
Salix sp.	Willows	oziisigobimizh (several species)
Sambucus racemosa	Red elderberry	papâshkisiganak, papaskatcîksi'gana'tĭg
Sanicula marilandica	Black snakeroot	ginebigojiibik, mazaan
Scirpus atrocinctus	Woolgrass	gaie'wuckuk
Scirpus pedicillatus	Stalked woolgrass	
Smilacina stellata	Starry Solomon's seal	anungokauh

Scientific Name	Common Name	Ojibwa Name
Solidago sp.	Goldenrods	ajidamoowaanow, wezaawashkoneg (*S. juncea, S. flexicaulis*); giiziso-maskiki (*S. canadensis*)
Sorbus americana	Mountain ash	adjimag
Sparganium glomeratum	Clustered bur-reed	
Spiranthes sp.	Ladies' tresses orchids	beemsquandawish (*S. romanzoffiana*); bine(wi)bag (*S. lacera*)
Streptopus roseus	Rosy twisted stalk	agwingosibag, agongosibag, nanebîte'ode'kîn
Symphyotrichum sp.	Aster	
Thelypteris palustris	Marsh fern	
Thuja occidentalis	Northern white cedar	giizhik, -ag; gizhikens, -ag; gi'jikan'dug, giizhikenh, songup
Tilia americana	Basswood	wiigob, wiigobaatig, wiigobimizh, wiigibiish, wiigobiishaatig
Triadenum fraseri	Bog St. John's-wort	
Trientalis borealis	American starflower	nawo'buguk, wunukibugauh
Trillium cernuum	Nodding trillium	
Trillium flexipes	Bent trillium	inĭ'nĭwĭn'dĭbĭge'gun
Typha latifolia	Cattail	apakway, apakweshk, apakweshkway, nabagashk
Uvularia sessiliflora	Sessile bellwort	neweîa'kwisînk
Vaccinium macrocarpon	Large cranberry	aniibimin
Vaccinium angustifolium	Lowbush blueberry	miinagaawanzh (plant); miin, miinan (berry)
Vaccinium myrtiloides	Canada blueberry	
Vaccinium oxycoccus	Small cranberry	mashkiigiminagaawanzh (plant); mashkiigimin (berry)
Vaccinium vitis-idaea	Lingonberry	
Viburnum sp.	Viburnum	aditeminagaanwanzh, atiteminagaawanzh (plant); aditemin, atitemin (berry, *V. lentago*); wabanwe'ak (*V. rafinesquianum*); aniibimin (berry), aniibiminagaawashk (plant, *V. opulus*)
Vicia americana	American vetch	
Viola sp.	Violets	ogitebagoons (*V. pubescens*); maskwĭ'widzhī'wiko-kŏk (*V. canadensis*); wewaîe'bugug (*V. conspera*)

Table 8. Vegetation Data Plot Plant Species Identified During NorthMet Cultural Landscape Study (Listed by Common Name)

Each of the following plant species was recorded on at least one of the 43 vegetation data plots that were installed as part of the Cultural Landscape Study. The species listed are only those that were found on a vegetation data plot. Many other plant species are present within the study area, but were not recorded on one of the 43 vegetation data plots.

The table provides the scientific name, the common name and the Ojibwa name (where available) for each species. Ojibwa names were obtained from *Plants Used by the Great Lakes Ojibwa* (Meeker et al. 1993). In cases where a plant on a vegetation data plot was identified only to genus, the Ojibwa names are given for several species within that genus. This does not imply that all of the species within that genus were identified on the vegetation data plots.

Common Name	Scientific Name	Ojibwa Name
Alder-leaf buckthorn	*Rhamnus alnifolia*	
American red raspberry	*Rubus idaeus*	miskominagaawanzh, miskwiminagaawanzh (plant); miskomin (-ag), miskwimin (-ag) (berry)
American spikenard	*Aralia racemosa*	chi-okaadaak, nezhikewang, okaadaak
American starflower	*Trientalis borealis*	nawo'buguk, wunukibugauh
American vetch	*Vicia americana*	
Aster	*Aster sp.*	wiiniziikens (*A. puniceus, A. nemoralis*); naskosi 'îcus (*A. cordifolius*)
Aster	*Symphyotrichum sp.*	
Balsam fir	*Abies balsamifera*	aninaandag, ininaandag, bigiwaandag, zhingob, zhingobaandag, zhingob bigiwaandag
Balsam poplar/Balm Gilead	*Populus balsamifera*	azaadii, maanazaadii
Basswood	*Tilia americana*	wiigob, wiigobaatig, wiigobimizh, wiigibiish, wiigobiishaatig
Beaked hazelnut	*Corylus cornuta*	bagaan (nut); bagaanimizh, bagaanens, bagaanaak (plant)
Beggars ticks	*Bidens sp.*	
Bent trillium	*Trillium flexipes*	inĭ'nĭwĭn'dĭbĭge'gun
Bigleaf aster	*Eurybia macrophyllum*	migiziibag, migiziwibag. Namegosibag
Bigtooth aspen	*Populus grandidentata*	azaadi
Black ash	*Fraxinus nigra*	aagimaak, wiisagaak
Black snakeroot	*Sanicula marilandica*	ginebigojiibik, mazaan
Black spruce	*Picea mariana*	gaagaagiwanzh, zesegaandag, zhingob, zhingob gaawaandag
Blue beadlily	*Clintonia borealis*	(g)odotaagaans, adota'gons, gînose'wībug, ozawa tootaugauhnse
Bluegrass	*Poa sp.*	

Common Name	Scientific Name	Ojibwa Name
Bluejoint	*Calamagrostis canadensis*	
Bog St. John's-wort	*Triadenum fraseri*	
Bog-laurel	*Kalmia porofolia*	
Bracken fern	*Pteridium aquilinum*	
Bristly rose	*Rosa acicularis*	oginiiminagaawanzh, kenukafta-minš
Brome grass	*Bromus sp.*	
Bunchberry dogwood	*Cornus canadensis*	ode'iminijiibik, zhakaagomin, zhaashaagominens
Bush honeysuckle	*Diervilla lonicera*	wežauškwagmik, osawa'skanet
Canada blueberry	*Vaccinium myrtiloides*	
Canada mayflower	*Maianthemum canadense*	agongosimin
Cattail	*Typha latifolia*	apakway, apakweshk, apakweshkway, nabagashk
Chokecherry	*Prunus virginiana*	asa/isaweminagaawanzh (plant); asa/isawemin (berry)
Club-mosses	*Lycopodium sp.*	
Clustered bur-reed	*Sparganium glomeratum*	
Coltsfoot	*Petasites frigidus*	
Common club-moss	*Lycopodium annotinum*	
Common plantain	*Plantago major*	ginebigowashk, ginebigwashk,omakakiibag
Common reed	*Phragmites australis*	aaboojigan
Common yarrow	*Achillea millefolium*	ajidamoowaanow, waabigwan
Cream pea-vine	*Lathyrus ochroleucus*	bagwajipin, baasibagak
Creeping snowberry	*Gaultheria hispidula*	waaboozobagoons, waaboozobanzh
Crested shield fern	*Dryopteris cristata*	ana'ganuck
Currants and gooseberries	*Ribes sp.*	kauwe-šabu-min, me'skwacabo'mînuk (*R. cynosbati*); amikomin (*R. americanum*); miishijiiminagaawanzh
Dewey's sedge	*Carex deweyana*	
Dogwood	*Cornus sp.*	
Drooping woodland sedge	*Carex cf. arctata*	
Dwarf red raspberry	*Rubus pubescens*	skižgu-min
Enchanter's nightshade	*Circaea alpina*	
field horsetail	*Equisetum arvense*	jasibonskok, aiankošing, gežibnusk
Fleabane daisy	*Erigeron sp.*	nookwezigan (several species)
Fly honeysuckle	*Lonicera canadensis*	
Forest pea	*Lathyrus venosus*	mĭ'nĭsĭno'wuck
Fowl manna grass	*Glyceria striata*	anagone' wuk
Fringed polygala	*Polygala pauciflora*	tikizidgeebikohnse
Goldenrods	*Solidago sp.*	ajidamoowaanow, wezaawashkoneg (*S. juncea, S. flexicaulis*); giiziso-maskiki (*S. canadensis*)
Graceful sedge	*Carex gracilima*	

Common Name	Scientific Name	Ojibwa Name
Gray dogwood	*Cornus racemosa*	miskwaabiimizh
Greater bladder sedge	*Carex intumescens*	
Green adder's mouth	*Malaxis unifolia*	
Hairy wood rush	*Luzula acuminata*	
Interrupted fern	*Osmunda claytoniana*	
Jack pine	*Pinus banksiana*	okikaandag, gîga' ndag
Jack-in-pulpit	*Arisaema triphylla*	zhaashaagomin
Kalm's hawkweed	*Hieracium kalmii*	waabigwan
Labrador tea	*Ledum groenlandicum*	mashkiigobag, mahkiikaang, waabashkikiibag
Ladies' tresses orchids	*Spiranthes sp.*	beemsquandawish (*S. romanzoffiana*); bine(wi)bag (*S. lacera*)
Lady fern	*Athyrium filix-femina*	a'sawan, ana'ganuck, nokomi'skînun
Lake sedge	*Carex lacustris*	
Large cranberry	*Vaccinium macrocarpon*	aniibimin
Leatherleaf	*Chamaedaphne calyculata*	waabashkikiibag, mashkiigobagoons
lichens	*Lichen*	
Lingonberry	*Vaccinium vitis-idaea*	
Lowbush blueberry	*Vaccinium angustifolium*	miinagaawanzh (plant); miin, miinan (berry)
Marsh fern	*Thelypteris palustris*	
Marsh marigold	*Caltha palustris*	ogitebag
Meadow horsetail	*Equisetum pratense*	wiishkobijiibik
Mountain ash	*Sorbus americana*	adjimag
Mountain maple	*Acer spicatum*	zhaashaagobiimag
Naked miterwort	*Mitella nuda*	
Needle spike-rush	*Eleocharis acicularis*	
Nodding trillium	*Trillium cernuum*	
Northern coralroot	*Corallorhiza trifida*	
Northern white cedar	*Thuja occidentalis*	giizhik, -ag; gizhikens, -ag; gi'jikan'dug, giizhikenh, songup
Oak fern	*Gymnocarpium dryopteris*	
Oat grass	*Danthonia sp.*	
One-flowered pyrola	*Moneses uniflora*	
Orange hawkweed	*Hieracium aurantiacum*	
Paper birch	*Betula papyrifera*	wiigwaas, wiiwaasaatig, wiiwaasi-mitig, wiiwaasimizh
Pearly everlasting	*Anaphalis margaritacea*	waabigwan, baasibagak
Pennsylvania sedge	*Carex pennsylvanica*	
Pin oak	*Quercus ellipsoidalis*	
Pussy-toes	*Antennaria neglecta*	gaagigebag
Quaking aspen	*Populus tremuloides*	azaadi, azaadiins

Common Name	Scientific Name	Ojibwa Name
Rattlesnake fern	*Botrychium virginianum*	gîckênsîne' namukuk
Red baneberry	*Actaea rubra*	ojiibikens, waashkobijiibikak, wiishkbobijiibik
Red elderberry	*Sambucus racemosa*	papâshkisiganak, papaskatcîksi'gana'tîg
Red maple	*Acer rubrum*	zhiishiigimewanzh, zhiishiigimiiwanzh
Red oak	*Quercus rubra*	mashkode'miizhimiszh, mitigomizh, wiisagi-mitigomizh
Red/Norway pine	*Pinus resinosa*	apakwanagemag, zhingobiins, zhingwaak
Red-osier dogwood	*Cornus sericea*	miskoobimizh, miskwaabiimizh
Reed canarygrass	*Phalaris arundinacea*	
Rein orchids	*Platanthera sp.*	
Rice grass	*Oryzopsis asperifolia*	
River bulrush	*Bolboschoenus fluviatilis*	
Rock club-moss	*Lycopodium lucidulum*	
Rosy twisted stalk	*Streptopus roseus*	agwingosibag, agongosibag, nanebîte'ode'kîn
Round-lobed hepatica	*Hepatica americana*	animozid
Running club-moss	*Lycopodium clavatum*	
Rushes	*Juncus sp.*	(gi)chigamiiwashk (*J. tenuis*); pis-nakniskuns (*J. effusus*)
Scouring rush	*Equisetum hyemale*	gijib'inukson', giji'binusk
sedge	*Carex sp.*	
Sensitive fern	*Onochlea sensibilis*	a'nana'ganuck
Serviceberry	*Amelanchier sanguinea*	gozigwaakominagaawanzh (plant); gozigwaakomin (berry); ozagadigom, zazigaakominagaawamzh
Sessile bellwort	*Uvularia sessiliflora*	neweîa'kwisînk
Side-bells pyrola	*Orthilia secunda*	
Skunk currant	*Ribes glandulosum*	waaboozojiibik
Small cranberry	*Vaccinium oxycoccus*	mashkiigiminagaawanzh (plant); mashkiigimin (berry)
Speckled alder	*Alnus incana*	wadoop, wadoopiin
Spinulose wood fern	*Dryopteris carthusiana*	
Stalked woolgrass	*Scirpus pedicillatus*	
Starry Solomon's seal	*Smilacina stellata*	anungokauh
Stemless lady-slipper	*Cypripedium acaule*	makizin (?)
Sugar maple	*Acer saccharum*	aninaatig, -oog; ininaatig, -oog; sinaamizh; adjagobi'min
Swamp fly honeysuckle	*Lonicera oblongifolia*	
Swamp red current	*Ribes triste*	miishijiiminagaawanzh, zhaaboomin, cigagwa'tĭgon
Sweet cicely	*Osmorhiza claytonii*	ozagadigom
Sweet-fern	*Comptonia peregrina*	kba'agne-minš, gibaime'nuna'gwus

Common Name	Scientific Name	Ojibwa Name
Tamarack	*Larix laricina*	mashkiigwaatig, mu'ckigwa'tĭg, mŏsh'kīkiwa'dik, pskignatik
Tesselated rattlesnake-plantain	*Goodyera tesselata*	
Three-fruited sedge	*Carex trisperma*	
Three-leaved gold-thread	*Coptis trifolia*	ozaawaajiibik
Three-leaved Solomon's seal	*Maianthemum trifolium*	
Three-lobed bedstraw	*Galium trifidum*	ojiibwe' owe' cuwun
Tickle grass	*Agrostis hyemalis*	
Tree club-moss	*Lycopodium dendroideum*	
Tussock cottongrass	*Eriophorum vaginatum*	bîwee' ckînuk, mesadi' wackons
Tussock sedge	*Carex stricta*	
Twinflower	*Linnea borealis*	neezhodaeyun
Viburnum	*Viburnum sp.*	aditeminagaanwanzh, atiteminagaawanzh (plant); aditemin, atitemin (berry, *V. lentago*); wabanwe'ak (*V. rafinesquianum*); aniibimin (berry), aniibiminagaawashk (plant, *V. opulus*)
Violets	*Viola sp.*	ogitebagoons (*V. pubescens*); maskwĭ'widzhĭ'wiko-kŏk (*V. canadensis*); wewaîe'bugug (*V. conspera*)
Virgin's bower	*Clematis cf. virginiana*	
Water horehound	*Lycopus sp.*	aandegopin (*L. asper*);
White pine	*Pinus strobus*	
White spruce	*Picea glauca*	gaawaandag, gaawaandagwatig, mina'ig, wadab, zesegaandag
Wild ginger	*Asarum canadense*	namepin, agabwen
Wild lettuce	*Lactuca canadensis*	odjici'gomĭn
Wild sarsaparilla	*Aralia nudicaulis*	bebaamaabiig, okaaadaak, waaboozojiibik
Wild strawberry	*Fragaria virginiana*	ode'imin (berry), ode'iminijiibik (root)
Willows	*Salix sp.*	oziisigobimizh (several species)
Wood anemone	*Anemone quinquefolia*	
Wood horsetail	*Equisetum sylvaticum*	siba'muckun
Woolgrass	*Scirpus atrocinctus*	gaie'wuckuk
Yellow birch	*Betula alleghaniensis*	wiinizik
Yellow hakweed	*Hieracium scabrum*	

Table 9. Plant Species Documented in Vegetation Plots and the ECS Vegetation Communities Where They Were Documented.

Each of the following plant species was recorded in at least one of the 43 vegetation data plots that were installed as part of the Cultural Landscape Study. The species listed are only those that were found on a vegetation data plot. Many other plant species are present within the study area, but were not recorded on one of the 43 vegetation data plots.

The table provides the scientific name, the common name, and the ECS vegetation communities where each species was documented.

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Abies balsamifera	Balsam fir	•	•	•	•	•		
Acer rubrum	Red maple	•	•		•			
Acer saccharum	Sugar maple		•					
Acer spicatum	Mountain maple	•	•		•			
Achillea millefolium	Common yarrow	•						
Actaea sp.	Red baneberry		•					
Agrostis hyemalis	Tickle grass	•						
Alnus incana	Speckled alder	•		•	•	•	•	
Amelanchier sanguinea	Serviceberry	•	•		•			
Anaphalis margaritacea	Pearly everlasting	•						
Anemone quinquefolia	Wood anemone	•	•		•			
Antennaria neglecta	Pussy-toes	•						
Aralia nudicaulis	Wild sarsaparilla	•	•		•			
Aralia racemosa	American spikenard				•			
Arisaema triphylla	Jack-in-pulpit		•					
Asarum canadense	Wild ginger	•	•					
Aster sp.	Aster	•			•	•		
Athyrium filix-femina	Lady fern	•	•		•	•		
Betula alleghaniensis	Yellow birch		•					
Betula papyrifera	Paper birch	•		•	•	•		
Bidens sp.	Beggars ticks						•	
Botrychium virginianum	River bulrush		•					
Bromus sp.	Rattlesnake fern	•	•		•			
Bulboschoenus fluviatilis	Brome grass							•
Calamagrostis canadensis	Bluejoint	•		•			•	•
Caltha palustris	Marsh marigold			•	•		•	
Carex cf. arctata	Drooping woodland sedge	•	•					
Carex deweyana	Dewey's sedge		•					
Carex gracilima	Graceful sedge		•		•			

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Carex intumescens	Greater bladder sedge				•			
Carex lacustris	Lake sedge				•			•
Carex pennsylvanica	Pennsylvania sedge	•	•					
Carex sp.	sedge	•		•	•	•	•	•
Carex stricta	Tussock sedge			•				
Carex trisperma	Three-fruited sedge				•	•		
Chamaedaphne calyculata	Leatherleaf					•		
Circaea alpina	Enchanter's nightshade	•			•			
Clematis cf. virginiana	Virgin's bower	•						
Clintonia borealis	Blue beadlily	•	•		•			
Comptonia peregrina	Sweet-fern	•						
Coptis trifolia	Three-leaved gold-thread	•		•	•	•		
Corallorhiza trifida	Northern coralroot				•			
Cornus canadensis	Bunchberry dogwood	•		•	•	•		
Cornus racemosa	Gray dogwood	•			•			
Cornus sericea	Red-osier dogwood	•		•	•			
Cornus sp.	Dogwood		•					
Corylus cornuta	Beaked hazelnut	•	•	•	•			
Cypripedium acaule	Stemless lady-slipper	•						
Danthonia sp.	Oat grass	•						
Diervilla lonicera	Bush honeysuckle	•						
Dryopteris carthusiana	Spinulose wood fern	•	•					
Dryopteris cristata	Crested shield fern			•	•			
Eleocharis acicularis	Needle spike-rush						•	
Equisetum hyemale	Scouring rush							•
Equisetum pratense	Meadow horsetail			•	•	•		
Equisetum sylvaticum	Wood horsetail	•						
Erigeron sp.	Fleabane daisy	•						
Eriophorum vaginatum	Tussock cottongrass					•		
Eurybia macrophyllum	Bigleaf aster	•	•		•			
Fragaria virginiana	Wild strawberry	•	•		•			
Fraxinus nigra	Black ash	•			•			
Galium trifidum	Three-lobed bedstraw	•	•		•			
Gaultheria hispidula	Creeping snowberry	•		•	•	•		
Glyceria striata	Fowl manna grass				•		•	
Goodyera tesselata	Tesselated rattlesnake-plantain	•		•				
Gymnocarpium dryopteris	Oak fern	•	•		•			
Hepatica americana	Round-lobed hepatica		•					

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Hieracium aurantiacum	Orange hawkweed	•						
Hieracium kalmii	Kalm's hawkweed	•						
Hieracium scabrum	Yellow hakweed	•	•					
Juncus sp.	Rushes		•				•	
Kalmia porofolia	Bog-laurel					•		
Lactuca canadensis	Wild lettuce	•						
Larix laricina	Tamarack	•		•	•	•		
Lathyrus ochroleucus	Cream pea-vine	•	•					
Lathyrus venosus	Forest pea	•						
Ledum groenlandicum	Labrador tea	•		•	•	•		
lichen	lichens	•		•		•		
Linnea borealis	Twinflower	•		•	•			
Lonicera canadensis	Fly honeysuckle	•		•	•			
Lonicera oblongifolia	Swamp fly honeysuckle				•			
Luzula acuminata	Hairy wood rush	•						
Lycopodium annotinum	Common club-moss	•		•				
Lycopodium clavatum	Running club-moss	•						
Lycopodium dendroideum	Tree club-moss	•	•	•				
Lycopodium lucidulum	Rock club-moss	•				•		
Lycopodium sp.	Club-mosses	•	•		•			
Lycopus sp.	Water horehound				•			
Maianthemum canadensis	Canada mayflower	•	•		•			
Maianthemum trifolia	Three-leaved Solomon's seal					•		
Malaxis unifolia	Green adder's mouth	•						
Mitella nuda	Naked miterwort			•	•			
Moneses uniflora	One-flowered pyrola	•						
Onochlea sensibilis	Sensitive fern				•			
Orthilia secunda	Side-bells pyrola	•						
Oryzopsis asperifolia	Rice grass	•	•					
Osmorhiza claytonii	Sweet cicely		•					
Osmunda claytoniana	Interrupted fern	•						
Petasites frigidus	Coltsfoot	•			•			
Phalaris arundinacea	Reed canarygrass				•			
Phragmites australis	Common reed							•
Picea glauca	White spruce		•					
Picea mariana	Black spruce	•		•	•	•		
Pinus banksiana	Jack pine	•				•		
Pinus resinosa	Red/Norway pine	•						

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Pinus strobus	White pine	•						
Plantago major	Common plantain	•						
Platanthera sp.	Rein orchids	•						
Poa sp.	Bluegrass	•	•					
Polygala pauciflora	Fringed polygala	•						
Populus balsamifera	Balsam poplar/Balm Gilead				•			
Populus grandidentata	Bigtooth aspen	•	•					
Populus tremuloides	Quaking aspen	•	•		•			
Prunus virginiana	Chokecherry	•						
Pteridium aquilinum	Bracken fern	•	•					
Quercus ellipsoidalis	Pin oak	•	•					
Quercus rubra	Red oak		•					
Rhamnus alnifolia	Alder-leaf buckthorn				•			
Ribes glandulosum	Skunk currant	•		•	•			
Ribes sp.	Currants and gooseberries	•			•			
Ribes triste	Swamp red current	•		•	•			
Rosa acicularis	Bristly rose	•			•			
Rubus idaeus	American red raspberry	•	•	•	•			
Rubus pubescens	Dwarf red raspberry	•			•			
Salix sp.	Willows	•				•	•	•
Sambucus racemosa	Red elderberry	•						
Sanicula marilandica	Black snakeroot		•					
Scirpus atrocinctus	Woolgrass						•	
Scirpus pedicillata	Stalked woolgrass						•	
Smilacina stellata	Starry Solomon's seal	•						
Solidago sp.	Goldenrods	•	•	•				
Sorbus americana	Mountain ash					•		
Sparganium glomeratum	Clustered bur-reed						•	
Spiranthes sp.	Ladies' tresses orchids	•						
Streptopus roseus	Rosy twisted stalk	•	•		•			
Symphyotrichum sp.	Aster		•					
Thelypteris palustris	Marsh fern		•					
Thuja occidentalis	Northern white cedar		•	•	•			
Tilia americana	Basswood		•					
Triadenum fraseri	Bog St. John's-wort						•	
Trientalis borealis	American starflower	•	•		•			
Trillium cernuum	Nodding trillium	•						
Trillium flexipes	Bent trillium		•					

Scientific Name	Common Name	ECS Community Types						
		FDn	MHn	FPn	WFn	APn	WMn	MRn
Typha latifolia	Cattail							•
Uvularia sessiliflora	Sessile bellwort	•	•					
Vaccinium macrocarpon	Large cranberry			•		•		
Vaccinium angustifolium	Lowbush blueberry	•	•	•	•	•		
Vaccinium myrtiloides	Canada blueberry	•				•		
Vaccinium oxycoccus	Small cranberry				•	•		
Vaccinium vitis-idaea	Lingonberry					•		
Viburnum sp.	Viburnum		•					
Vicia americana	American vetch	•						
Viola sp.	Violets	•	•	•	•		•	

6.3 Wild Rice Study Methods

The studies described in 3.2.9.1 comprise the following methods (Maps 17, 18). First, qualitative and quantitative wild rice surveys were carried out to determine wild rice presence, density, and stand size. Surveys were carried out between August and September for the last two years and are scheduled to be repeated over the next 2 to 4 years. The duration of a wild rice population cycle is approximately 4 to 6 years. Qualitative estimates of wild rice coverage have been carried out by canoeing or kayaking along the perimeter of wild rice beds, recording bed locations using a Trimble® GPS Pathfinder® ProXH™ receiver, and recording approximate stand density using a density factor with a scale of one (low density) to five (high density) (similar to the method used by 1854 Treaty Authority, "Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998- 2008)").

Quantitative estimates of wild rice coverage will be determined from representative sampling grids of 10 meters by 10 meters. Grid sampling will be carried out in areas with a density factor between three and five. The number of grids sampled depended on available resources (staff and funding). Within each grid, 20 one-meter by one-meter plots were randomly selected using a computer random number generator. Each randomly selected plot was sampled using a 0.5 m^2 sampling square made from PVC piping (0.71 m on each side). The square was placed on the water surface at each randomly selected plot and the rice stems within the 0.5 m^2 square were counted. Stem height above the water surface was measured for one to five plants within each 0.5 m^2 plot. Height was measured at the plant's highest point (seed head or flag leaf depending on stage of plant growth). Stem count sum, mean, median, and standard deviation will be calculated based on the stem count for 20 plots. The total stem count for each grid comprised 10 percent of the grid area. The total area sampled for each grid was 10 m^2 (20 plots x 0.5 m^2 each). UTM coordinates for each plot in each grid were recorded. The same grids have been and will be visited each year for a total of 4 to 6 years. Plants will be recounted, measured, and basic statistics will be calculated.

Second, Barr collected water samples for sulfate testing as well as other major anions and cations near wild rice stands. Water samples were collected, in most cases, at the time of wild rice sampling (one time per season). Third, plant growth parameters were analyzed *ex situ.* Ten plants were collected from each grid to determine total plant, root and seed biomass. The number of seeds per plant were counted. Basic statistics were calculated.

Finally, some sediment pilot studies have been carried out. Sediment characteristics, such as percent water and percent organic content, are highly variable in Minnesota streams, rivers, and lakes. The MPCA is currently proposing a study of wild rice and sulfur chemistry that includes investigation of sediment characteristics, in large part to investigate the conditions that result in the transformation of sulfate to hydrogen sulfide. Analyzing sediments in which wild rice grows provides some baseline chemical and physical data to assess conditions supporting wild rice populations. As with the water quality sampling, sediment sampling may provide information that assists in better understanding factors that affect wild rice population dynamics.

No standardized protocol for *in situ* assessment of sulfur speciation in northern boreal systems exists. Barr has consulted with experts in biogeochemistry, sulfur chemistry and soil science regarding the best methods to examine sediments near wild rice stands based on tested methods. This work is ongoing.

6.4 Archaeological Fieldwork Report
See summaries in 3.2.10.2, 3.2.11.1, and 3.2.12.1-4.
Report on file, Corps.

6.5 Tribal Elder Interview Reports

6.5.1 Bois Forte Band Interviews, January 2011
6.5.2 Interview with Rose Berens, May 11, 2011
6.5.3 Bois Forte Band Interviews at Vermilion PowWow, June 18-19, 2011

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6.5.1

Identification of Historic Properties of Traditional Religious and Cultural Significance to The Bois Forte Band in the NorthMet Project Area of Potential Effect

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Introduction

This report presents the results of a survey to identify historic properties of spiritual and cultural significance to Indian tribes within the NorthMet project Area of Potential Effect (APE), evaluate whether adverse impacts to properties would occur as a result of the proposed mining, and if necessary, prepare and execute a plan to mitigate adverse impacts. The survey consisted of conducting interviews with tribal elders to document the presence of historic properties of spiritual and cultural significance.

Obtaining information on historic properties of spiritual and cultural significance to Indian tribes is complex. Sharing information on resources that comprise cultural identity with outsiders is carefully considered by tribal members because history has shown the information may be misused and/or exploited at the expense of the individual, tribe or resource. In some instances it is taboo to discuss activities with others and prohibited for another to ask. This methodological and sampling problem results in the under-representation of historic properties of spiritual and cultural significance to Indian tribes in resource inventories.

In an effort to comply with federal regulations to identify and document historic properties of traditional spiritual and cultural significance to Tribes the Bois Forte Tribal Historic Preservation Office (THPO) proposed to document these resources. The proposal grew out of consultation between the Ojibwe Bands and the US Army Corps of Engineers.

Project Setting

The proposed project area is located on the southern flank of the Mesabi Iron Range in St Louis County near the headwaters of the Partridge and Embarrass River watersheds. The area is characterized by extensive wetlands overlying the relatively thin surface tills closely underlain by bedrock. Uplands support mixed pine - hardwood (including maple) forest and black spruce – jack pine woodlands occur in the lowlands in addition to aspen birch forests, alder swamps and low shrub fens.

The area supports species that are significant to the Bands and include moose, deer, grouse and several furbearing taxa. Water bodies including Trimble Creek, the Partridge and Embarrass Rivers, Colby Lake and Whitewater Reservoir contain a variety of fish including northern and walleye pike in addition to wild rice which are also of concern.

Methodology

Over two dozen elders were contacted following an initial letter to all elders explaining that the Bois Forte THPO was interested in talking with anyone who was willing to share knowledge or information about the project area. Eleven elders contacted the THPO and eight provided at least some information about the project area. In addition, two non-Band members, Becky Gawboy and Howard Heath, provided information about Bois Forte cultural activities. Ms. Gawboy is married to Jim Gawboy and Mr. Heath is acquainted with the interviewer, Marybelle Isham. Howard Heath was a High School teacher in Aurora, Minnesota and has studied the history of northeastern Minnesota.

During June, July and August, 2010 the Bois Forte Tribal Historic Preservation Office conducted interviews of Bois Forte Band members with knowledge of the project area. The actual interviews were carried out by an elder, Marybelle Isham, who volunteered to be involved in the project. The interviews were conducted at the Heritage Center or individuals' homes and recorded when allowed. Six questions were asked during the course of the interview and appear in Table 1.

In addition to interviews, the THPO reviewed the archives at the Bois Forte Heritage Museum and asked Band members about any photographs or written documentation in their possession. One photograph of three people at a sugar camp, identified as being near the Spring Mine, occurred in a collection belonging to Alex Pete. Unfortunately, the photograph was not found until after Mr. Pete's passing in early December 2010, and there is little additional information beyond the description on the reverse side of the print.

Table 1. Interview Questions.

1. Do you know of trails or routes that passed through the area; especially near the Laurentian Divide that may have been routes leading to sacred places or links?
2. Can you point out areas on the map that were used for hunting or fishing?
3. Can you show areas on the map that were used for cultural activities such as sugar bushing or gathering bark?
4. Do you know of any sacred areas where ceremonies were held or plants gathered for medicine?
- How do you remember these taking place or changing over time?
5. Do you remember stories or oral histories of the area?
6. Do you recall traditional names of lakes, streams, outcrops, hills, important views?

Results

All eight of the elders provided some information about the project area and recalled general use of the area by family or Band members. Four interviewees mentioned trails that were used for hunting, fishing and plant gathering. One elder recalled being in the area as an independent logger, but did not mention exercising usufructuary rights while there or by others. Only one elder, Jim Gawboy described a specific trail, the Thunderbird Trail, which traverses the Laurentian Divide. Mr. Gawboy also notes that when trains became available, they were utilized by Band members for access to traditional use areas. Robert Boshey also mentions that trains were used by Band members. This information suggests that at least some traditional means of access were used less frequently once other means of transportation became available and may help explain the overall lack of information about trail location and specific function.

Subsistence activities; hunting, fishing or plant gathering, were mentioned by seven of the people interviewed. They recalled use of the area by relatives, and occasionally the type of resource, (wild rice, maple sugar, berries, and birch bark), although little information on location was provided. Only one elder, Jim Gawboy, provided a specific location for a cultural activity, in this case a sugar camp utilized by his parents, which was "across the lake from Giants Ridge."

Other evidence for practicing usufructuary rights within the project area occurs as a black and white print. The photograph is small (less than 2 inches by 3 inches) and features three people in a hardwood forest. The individuals are standing in front of an arbor and holding items associated with making maple sugar. The caption on the reverse, printed in block letters with a pencil reads "MA & PA & ME SUGAR MAKING IN SPRING MINE MESABA, MINN, 1942." The Bois Forte THPO has to identify the individuals in the photograph. However, evidence of a sugar camp within the present PolyMet Mine property is well known to mine personnel and has been visited by the Bois Forte THPO staff and the US Army Corps of Engineers (USACE) Archaeologist, Brad Johnson. Artifacts on site surface date from the late 19th century though at the 1940's. The camp is close to Spring Mine Lake (the former Spring Mine) and is apparently the location of the sugar bush referred to on the back of the photograph.

The topic of sacred or ceremonial areas was addressed by three Band members and Becky Gawboy. Not surprisingly, the subject of graves was mentioned in only the most general terms and by only one person, Spiritual Advisor, Ken Boney. Burials are an extremely sensitive issue and specific information on grave locations would only be revealed if the informant was certain that the knowledge would not be exploited and/or lead to desecration of the graves. The other types of sacred or ceremonial activities mentioned were pow-wows and spiritual journeys. Pow-wows were not known to occur within the project area, only in the vicinity of Tower, Minnesota.

Spiritual journeys are associated with the Thunderbird Trail which traverses the Laurentian Divide, eventually leading to Thunder Bay and Thunder Mountain in Canada. The Trail is used for both physical and metaphysical journeys and has a corporeal and spiritual beginning and ending. Offerings occurring along the way represent a substantive acknowledgement of the trails' spiritual power.

Concern over mining in the 1854 ceded territory in general and the PolyMet Mine specifically became apparent during the course of the interviews. Five people expressed alarm ranging from apprehension to outrage. Warner Wirta expressed his dismay in both the interview and an email to the Deputy THPO, Bill Latady:

"I have been in contact with State of Minnesota Rep. Roger Reinart and he talks about his support for the "Minnesota Security bond 'if accidental discharge of Sulfates, or other toxic residue into any Steam, Lakes, Lowlands of N.E. Minnesota by PolyMet mining operation, the State of Minnesota will be protected.' These poisons will last up to 2,000 years. How about the little people like me that want to live here? How about Indian Spiritual-Culture which revolves around what happens in the Streams, rivers, Lakes, Lowland Wild Rice? These things are practiced in Indian Spiritual-Culture. PolyMet is trying to lobby the MPCA into relaxing their sulfate standard of 10mg/l. This will give them a greater discharge level of sulfate pollution they can dump into the rivers, streams, lakes and lowlands in northeastern Minnesota. PolyMet has already said some toxic sulfates and other toxic residues will escape into streams, rivers, lakes and lowlands due to mining of heavy metals. This is a real cover-up. This is a real slap in the face of Minnesota Chippewa Indian Spiritual-Culture. They must not get by with this. When the new 8th District Congressman Chip Cravaavak states PolyMet can mine for Heavy metals "for National security reasons" is like kicking Indian people in the head when they are down. It's insulting!

How about the leeching of these caustic metals that will get into the fresh water tables of local towns, rural people who have selected to live there? How can the multi-million dollar casinos and tourist trade in this region be protected from this developing threat?"

Other respondents were less emphatic, but no less concerned and think the beauty of the area will be impacted no less than usufructuary resources. Future generations will not have the opportunity to practice time-honored cultural activities because of the potential for harm to the environment and by extension the cultural resources, i.e. wild rice, maple syrup/sugar, medicinal plants and fish, to name a few.

Discussion

The survey of Band members who may have knowledge of historic use of cultural resources within the APE of the proposed PolyMet NorthMet Mine provided general information about the area and how usufructuary rights were practiced. The THPO had hoped to have the names of families with particular ties to the area, but overall there is little extant information, at least among the elders who were contacted. Undoubtedly, had we been able to interview elders a generation or two prior to this one there would have been considerably more information.

The single exception was finding the photograph featuring a family at the Spring Mine Sugar Camp. Clearly, Band members were obtaining maple sugar in the area where the mine is located in the early 1940's and probably continued to do so until they were effectively "locked out" of the area with the onset of taconite mining operations in the 1950's. Artifacts at the sugar camp indicate it was in use through the 1940's. The tie to the Bois Forte Band will be strengthened once the people in the photograph are identified. The Bois Forte THPO considers the Spring Creek Mine sugar camp a culturally significant property that will require further work to fully identify and record its history.

Nonetheless, the interviewees identified a number of activities that occurred in the area ranging from subsistence to spiritual. Band members identified medicinal plant gathering, wild ricing, hunting and fishing as having occurred within the APE by relatives, other Band members, if not themselves. Sacred/Spiritual activities were also identified, including burials and Thunderbird Trail. The locations of graves were described as being associated with where people lived.

There are also concerns about the potential effects that the PolyMet Mine will have on the ability of Band members to pursue their usufructuary rights within the ceded territory. Fears that caustic chemicals used in the copper nickel extraction process could leak into the ground and ultimately affect the groundwater are not without merit. In addition, possible changes in regulatory statutes that would relax standards for sulfates in groundwater and affect lakes, rivers and streams would permit added pollution to waters used for wild rice, fishing and hunting. Marybelle Isham nicely summarizes the unease expressed by many Band members in regards to the proposed mining activities:

> *"To reiterate the results of the interviews and heartfelt information I received from the people about the area around Hoyt Lakes, there are rivers with wild rice and woods where medicinal plants grow. Unfortunately there is not an exact location where any particular Band member collected flowers, plants, roots or bark, as only the person making the medicine knew the whereabouts of the plant needed. The area still supports cranberries, blueberries and trees with barks that was (and still is) used for illness. In addition, the pristine waters, fish, and natural habitat for fur bearing animals and birds will be affected by the mine. Our thoughts are on the generations to come and the generation that is here now."*

The distress over the loss of traditional lifeways within the 1854 Ceded Territory is seen as not only affecting present generations, but future ones. It is the responsibility of living Band members to make decisions that will guarantee that seven generations in the future will have the wherewithal to not only survive, but prosper. If Minnesota environmental standards are relaxed, increases of chemicals in surface water will affect groundwater as they are inseparable. Polluting either will affect not only water, but every living organism in the vicinity and downstream. Once this happens, it is only a short time before organisms which people depend upon such as wild rice, fish and game animals are negatively affected and retaining usufrutuary rights to hunt, fish and gather will be a moot point.

(Appendix I-Bois Forte Interviews)

Polymet Cultural Survey
By
Marybelle Isham

Introduction

The purpose of the project was to interview Band members concerning their use of the Polymet Mining area through exercising their treaty rights to hunt, fish and gather within the 1854 Ceded Territory. The two main considerations guiding these interviews were:

- Did you, family or anyone you know visit the Polymet Mining area (near Hoyt Lakes), including the Embarrass River and Upper Partridge River to hunt, fish, gather medicine, pick rice, or have a maple sugar camp?
- Interview Band members about their thoughts on the proposed Polymet Mine and its potential impacts to the area and on Band members exercising Treaty Rights within 1854 Ceded Territory.

These considerations were used to generate six questions that were asked during the course of the interviews:

1. Do you know of trails or routes that passed through the area; especially near the Laurentian Divide that may have been routes leading to sacred places or links?
2. Can you point out areas on the map that were used for hunting or fishing?
3. Can you show areas on the map that were used for cultural activities such as sugar bushing or gathering bark?
4. Do you know of any sacred areas where ceremonies were held or plants gathered for medicine?
    - How do you remember these taking place or changing over time?
5. Do you remember stories or oral histories of the area?
6. Do you recall traditional names of lakes, streams, outcrops, hills, important views?

Interviews

Elder Band members: Phyllis and Bobby Boshey:

Phyllis was born at Nett Lake and her mother was born at Pelican Lake. Her father was born at Namakan Lake. Bobby was born at Burnside Lake, as was his father Robert Boshey, his mother's name was Jenny Pete.

They reported that wild rice was harvested in the area of Hoyt Lakes, an area called the Seven lakes a part of the St. Louis River. There were portages to the lake, they also remembered railroad tracks. Another lake was where Phyllis' great grandparents riced, called Birch Lake. They lived nearby at White Iron. Maple sugar camps in that area were at Eagle's Nest and Mud Creek.

Elder Band member: Clifford Sam

This interview was conducted in Virginia, MN at Clifford Sam's residence. He grew up outside of Tower, Minnesota with his parents David Sam, Jr. and mother Emma, one brother and one sister. Clifford did some logging in the Hoyt Lakes area, strip cutting around the mine as an independent logger.

The Laurentian Divide is a sacred place where we bring tobacco to honor our spirituality. Clifford stated that the woodland area should be kept the way it is. When they start digging into the earth for various minerals the beauty of the land is taken away. He also recognizes that it's hard to combat large corporations and companies that have the money, power and lawyers to back their play. But we have to think of future generations.

Elder Band member: Knute Grave lives in Virginia, Minnesota.

He is the son of Nels Grave and Evelyn Wein. Knute stated that he knew some stories that his parents told of how most of the summer was spent gathering food for the winter, from making maple sugar, picking berries, and birch bark. He knows of some trails and passage ways in the area in question that were used for travel to pick wild rice. The mines are taking away the beauty of the land leaving big piles of earth, taking away the trees and waterways, disturbing protected land.

Spiritual Advisor for Nett Lake Reservation: Kenneth Boney

He was born and raised in Nett Lake. He stated that long ago in the Hoyt Lakes area hunting and trapping occurred in that area. He didn't think people stayed there very long, only to accomplish their purpose. He imagines that if people died there, they would be buried there, so there must be graves. When asked about trails he said that he had heard there were trails, probably well traveled and maintained. He also thinks that other tribes, the Cree and Sioux, used the area and probably used different medicinal plants growing in that area. When asked about heavy metal mining playing a role in the bands future, Mr. Boney stated that mining is bound to have some effect on everything really, where they dump their tailings which will affect the drinking water. It may not happen right away, but sooner or later it will.

Bois Forte Elder: Raymond Boshey, Vermilion Reservation

His parents were Thomas and Josephine Boshey and he recalls being taken out of school for a week and would board a train from Tower to the Embarrass area. There they would walk up a hill to where they made a maple sugar camp. He recalls that the entire area was one solid ledge. He was not clear if the medicinal plants his dad used were from that area or their uses.

Bois Forte Elder: Warner B. Wirta

He resides in Duluth, MN with his wife Martha and grew up in Embarrass where he lived with his parents, Samuel Victor Wirta and Clara his mother. Clara was born at Jack Fish Bay on Basswood Lake. The area southeast of Embarrass has a creek and river system and throughout this vicinity there are cranberry bogs and wild rice beds. The Laurentian Divide divides the water system; the rivers flow in two directions. On the northern side of the Divide the streams flow north to Hudson Bay. South of the Laurentian Highland the rivers flow south. The Embarrass River flows south into the St Louis River which empties into Lake Superior. Because of the sandy loam soil that characterizes the area, there are a lot of blueberry patches, the natives from Vermilion picked blueberries in that area. Mr. Wirta recalls pow-wows held at Big Rice Lake and Little Rice Lake, near Tower, where there was an abundance of wild rice.

Mr. Wirta stated that he is a member of the Indian community of Duluth, Minnesota and attended a meeting on November 4, 2010 at the MPCA, concerning ricing in Minnesota. He is very concerned that PolyMet Mining Corporation is lobbying MPCA to increase the 10mg/L sulfide standard thus permitting an increase of sulfide discharges into the rivers, lakes and bogs. He is worried that PolyMet will get the green light to discharge greater amounts of sulfides and other pollutants into the pristine rivers, lakes and bog system. This will destroy the remaining wild rice, threatening ricers and Indian culture. He thinks that the MPCA should tighten the standard and does not want any heavy metal mining taking place in Minnesota.

Bois Forte Elder: Jim Gawboy

He and his wife Becky live in Tower, Minnesota. Jim spoke of the members of his family. Concerning this project, he recalls the family moved according to the seasons of harvesting. The family would go up the Pike River, then the Embarrass River and make maple sugar on the hills in the area roughly across the lake from what is now Giants Ridge. Each family had a little camp. Later when the railroad tracks were put in, the family would catch the train in Tower and on the return trip needed only to wave a cloth and the train would stop.

He spoke about the Thunderbird Trail, which is located where Hwy 53 crosses the Laurentian Divide, and follows the ridge all the way to Thunder Bay to Thunder Mountain. The Thunderbird Trail is hard to describe, it is a spiritual path which the Thunderbird uses, and only those who really want to see the Thunderbird regard it as a sacred place, and a place to leave offerings, and tobacco.

Becky Gawboy stated that her knowledge of the Thunderbird Trail was taught to her by elders from Grand Portage and Nett Lake. The story was that the Spiritual Power of all of us here comes through the Thunderbird. This is an important and powerful trail that has to be guarded and protected, because there are many gifts that Indian people, indeed all people, still need. Traditional plants grow everywhere, some only in certain soils, and weather conditions, roots, bark, and even flowers are still used medicinally for illnesses.

Summary

My name is Marybelle Connor Isham, I am an elder from the Bois Forte Nett Lake Reservation and a daughter of Lawrence and Ida Connor. I was born and raised on the reservation.

To sum up the information received from people who were interviewed. I will quote from the interview of Howard Heath of Hoyt Lakes. Mr. Heath is not a Band member, but taught high school in Orr and has been fascinated with the history of NE Minnesota for years. “The treaty of 1854, September 30, ceded the lands for hunting, fishing, and gathering. A portion of this land runs right through the area in question. In T60N, R13W, an Indian trail from Lake Vermilion to Beaver Bay crosses the upper Partridge River. There is more information on how the trail splits going in other directions. On present

day maps the Tomahawk Trail (gravel road) goes from Babbitt to Hoyt Lakes, through Skibo. The road goes through some pretty wild country, (where I'm sure medicinal plants are well and, thriving) the Dunka River and numerous creeks are crossed by the gravel road. On both sides of the road, deer, wolves and moose, use and live in this area."

To reiterate the results of the interviews and heartfelt information I received from the people about the area around Hoyt Lakes, there are rivers with wild rice and woods where medicinal plants grow. Unfortunately there is not an exact location where any particular Band member collected flowers, plants, roots or bark, as only the person making the medicine knew the whereabouts of the plant needed. The area still supports cranberries, blueberries and trees with barks that was (and still is) used for illness. In addition, the pristine waters, fish, and natural habitat for fur bearing animals and birds will be affected by the mine. Our thoughts are on the generations to come and the generation that is here now.

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6.5.2

Interview with Rose Berens
May 11, 2011
Bois Forte Heritage Center
Tower, Minnesota

Conducted by Carole Zellie
Landscape Research LLC

for the

NorthMet Cultural Landscape Study

PolyMet Mining Inc.
P.O. Box 475 County Road 666
Hoyt Lakes, MN 55750

Introduction

On May 11, 2011 Carole Zellie of Landscape Research LLC conducted an interview with Rose Berens at the Bois Forte Heritage Center. Rose is a Bois Forte Band member and grew up on the Nett Lake Reservation. She resides in Embarrass, Minnesota. Rose is the Bois Forte Tribal Historic Preservation Officer and has extensive knowledge of the landscape and community. The interview was conducted for the NorthMet Cultural Landscape Study and focused on spiritual beliefs about the landscape as well as traditional Ojibwe use of plant and wildlife resources. Rose has previously participated in meetings and fieldwork for the Cultural Landscape Study.

Rose observed, "our lives are organized around nature, every day."

Wild Rice

"Rice is why we are here."
"It has always been a part of my life."

Wild rice is just something that was always there; you are fed it as a baby as one of your first foods; it is used not only as a food but also as a medicine. Women want children to eat wild rice. The rice harvest is an important part of ceremonies and celebration.

"It reminded them who they were."

When I was growing up in Nett Lake, every fall the village would be filled with people I had not seen all year from as far away as California and Oregon. They traveled to Nett Lake to pick rice to eat and sell, but also to celebrate their connection with it and with their relatives. They might stay for a month and live in a different world. Then they could look back on the fall, what they had done, and the memory would carry them the rest of the year.

Maple Sugar and Memories

Rose noted that an elderly woman from Nett Lake told her about going to the Laurentian Divide"—*Missabe Widjiw*—to make maple sugar. Why, she asked, would you go so far—"there are sugar bushes right by your home and you aren't from there!" She replied "that's is where we came from!"
"You pick and you hunt and you harvest where your family did."

Someone who lives miles away but would return to an area near the Embarrass River, for example, is tracing the places that their ancestors came. They are thinking, "I want and I need to pick in that place."

Reassurance

At the maple sugar ceremony in spring we give thanks for making it through winter and looking for reassurance that berries will be there for harvest during the summer. Fall brings rice harvest and thanks for abundance. The first rice picking was preceded by a ceremony that included elders, including an elder woman who would "no longer have her moon." Two or three canoes would go out alone and the elders would harvest by hand, bending the stalks over and shaking the rice into the canoe. A spiritual leader would smoke a pipe and give thanks, and until that happened no one else would pick rice.

Offerings

Before picking berries for the first time—high-bush cranberries, blueberries, strawberries, raspberries, gooseberries—families offer a small portion of the first pick, mixed with rice. Tobacco is smoked, and prayers are offered. After that, if you went picking blueberries during the season, you offer something, a pinch of tobacco each time.

One of the things we are taught is we are living in a garden that the Creator has allowed us to live in. This is His; we can't just go and pick whatever we want. Tobacco is a medium for prayer; it allows our prayers to go to the Creator.

Tobacco was obtained in trade, but was also grown by Indians in northern Minnesota who obtained seeds in trade.

The Giant Man

Messabay—the Laurentian Divide—stretches to Thunder Bay and there are many points of connection. We recognize the power of the area, which means Giant Man. The Giant Man walked across the land and his footsteps created the Laurentian Divide. When he reached Thunder Bay he lay down and went to sleep. We believe he will rise out of the water. He protects a silver mine.

The Overlook (Section 2 of T60N, R14W)

"Something to make us stop and spend some time."

Rock outcrops are "high power" areas, especially east-facing. The east-facing outcrop in the NorthMet Project Area is not common and this type of feature could not go unnoticed; it would be used for spiritual purposes. It would be a spot to go for special occasions or ceremonies. Such a spot near rails would have been used by people who used trails. Visiting such a spot I would find a little protruding rock and leave some tobacco; instantly I would imagine people sitting there, using it for a vision quest. Fathers might take their sons to such a place to fast.

Hunting

"Animals know that is their purpose."

In these areas the Anishinabe people relied on moose. The moose was processed and dried, and shared with others. The same ceremony and spirituality observed for ricing and sugaring happened with hunting and fishing. Animals are part of Creation and are in this garden to keep us alive. Before my grandfather hunted for deer I would not think about the animal spirit or wishing him luck. The animal spirit might hear you. He would put out tobacco and pray for sustenance for his family, and he might have a better chance with the animal and it would offer itself to him. If he shot a deer he might offer water by its mouth and tobacco: "thank you for giving your life so I can live." You knew that you were getting food but taking life: making something end. We did not consider ourselves above animals, but our brothers and sisters.

It is disrespectful to eat from the garden before making the first offering to the Creator. For an offering after a hunt a piece of meat would be cut off and mixed with rice or berries, and put on a dish of birch bark.

Trails

(Several Indian trails, including the Lake Vermilion to Beaver Bay Trail and also what Trygg called the "New Indian Trail" cross the (PolyMet) NorthMet Project Area.)

If there was no mine at PolyMet we would probably not be using the trail like 200 years ago, but I am certain it would be still walked at least once a year from Bois Forte to Grand Portage because it is our connection to relatives in Grand Portage. Because of modern times it would be a spiritual journey, not about transportation. Somebody from Grand Portage would say, "its time we walked that trail—I'll meet you in the middle." It wouldn't be used for travel, but would be walked to keep the trail alive. We pounded it into the earth and it is to us alive. It contains spirituality and memory of long ago that some of use have. Trails are a deep intricate part of nature and culture. If the mines were not there it would be used in a ceremonial way.

6.5.3

Bois Forte Band Interviews
June 18-19, 2011
Vermilion PowWow
Tower, Minnesota

Conducted by
Rachel Walker, Barr Engineering
and
Carole Zellie, Landscape Research LLC

for the

NorthMet Cultural Landscape Study
PolyMet Mining Inc.
P.O. Box 475 County Road 666
Hoyt Lakes, MN 55750

Introduction

On June 18 and 19, 2011 Rachel Walker of Barr Engineering and Carole Zellie of Landscape Research LLC conducted interviews with Bois Forte Band elders at the Vermilion PowWow in Tower, Minnesota. Bev Miller of the Bois Forte Heritage Center assisted in organizing the interviews on both days.

The purpose of the interviews was to gain an understanding of elders' and the Bois Forte community's spiritual beliefs about the area landscape as well as the traditional use of plant and wildlife resources. The interviews were held outdoors during the PowWow. Most of the elders discussed their lives at Nett Lake and in the Lake Vermilion area, as well as in many other places including the U.S. military. The questions listed on page 12 were a general guide for the interviews, which ranged across many topics. The interviewers used maps to focus on the area around the NorthMet project, but although most people had general knowledge of the area their main knowledge was of traditional areas around Nett Lake. Two of the six respondents lived near the project area: Bev Miller in Embarrass and Phyllis Boshey in Tower.

June 18, 2011
1. Bev Miller, Embarrass *(largely recorded by Carole)*

(Bev Miller was born at Nett Lake and grew up in foster homes before graduating from Aurora High School. She worked on the west coast for a number of years before returning to Bois Forte where she reclaimed her traditional heritage and studied the Ojibwe language.)

I dream of animals who are protectors, such as the wolf and bear.

Spirits travel along the Laurentian Divide. I saw a flash rise up over the [Laurentian Divide (Thunderbird Trail)]. A spiritual advisor told me that was a Thunderbird. When storms come, the thunder is the thunderbirds. Pipes come from thunderbirds. [One] must feed the thunderbirds [as one would feed any spirit].

My Indian name is *nay-ta-wa-us-shinok*: a lady floating on the water.

Plants that are special for healing include sage, sweetgrass, cedar, tobacco, and wild rice. Rice can be used for ceremonies. It can be popped in oil and combined with blueberries. Traditional healing can be combined with standard medical care

We are taking a pontoon of elders next week to Stuntz Bay. [Some have discussed the presence of] a kind of rock that is not typically found here, a volcanic rock. Near this rock are some [remains] of "rice pits."

2. Harold Goodsky, Orr, Minnesota *(largely recorded by Carole)*

If you don't follow tradition you are not going to be a complete human being. We were brought to respect elders to respect the body, and respect everybody else. Seasons and the circle of life follow four parts.

Mining and logging have changed the landscape. My people used to go down the Embarrass to Lake Vermilion to Pelican to Nett Lake. "There is no more lake trout in the Lost River, it is contaminated. There used to be rice all over the shores of Nett Lake. How can moose eat shales? Anybody knows, they are taking minerals out of the land and logging, anything to save jobs. There are no more ducks at Nett Lake. I guided on Nett more than 25 years ago and the flyway has changed. Lake Vermilion is now red.

3. Ron "Mootz" Geshick, Nett Lake ***(largely recorded by Rachel)***

I was born on the Nett Lake Reservation and live in the same house today. Our people have been here for [what seems like] forever. We have always been here and for us that means forever. We have always had: respect for land, respect for water, respect for air, respect for all animals, respect for life. This is the way our people have been, but this is not [so much the case] anymore.

We live with the seasons. The gifts we were given include: wild rice, blueberries, sugaring. All these things are gifts from the Creator. It's something for us to use and not to [use these resources] with respect [would be incorrect]. This is what we've been taught. Some of these traditions are coming back.

When I was growing up, I was not taught my language. My parents knew [Anishinaabe] but did not speak it to us. They were intimidated. The most important [thing we must do today] is to revive our language.

My parents and grandparents are also from Nett Lake. My mother was born [near/on] Moose River [also known as Moose Bay – flows from Kabetogama south to Nett Lake]. My mother was born ~ 1910 and my father was about 15 years older than she was. Since the 1700's [the Anishinaabeg] lived further out East.

We always riced on Nett Lake. The stands are still there. We also gathered nuts (hazelnuts), berries, and [carried out] sugaring. We collected roots [for food]. We did some mushrooming (Cantrells/Chanterelles). Medicine is another thing (using foods for medicine in addition to food). A lot of that [knowledge] has been lost. Some activities such as logging and farming have [led to the disappearance] of some plants.

I think people will come back to the traditions. We have the Circle of Life. It is one of our traditions. We come into this world and then we leave it. I like when young people show interest in [our traditions]. I believe 100 percent in the "natural way," "the natural world."

[When I was growing up], our family subsisted on hunting, fishing, and trapping. We trapped martens, fishers, beaver and mink. We used to eat muskrats and beaver. Gardening was not common because the soils are poor. We got some milk from a local dairy owned by a family called Anderson. It was about 15 miles away.

[When I was growing up], there was one road into and out of Nett Lake [Reservation]. We riced Nett Lake, Vermilion River, and Big Rice Lake. Rice was pretty easy to get. It was easy to harvest, finish, it kept a long time. As long as you keep it cool, it can keep for years. In Mountain Iron, I have a friend who lost her son about [35] years ago. She still has the rice he harvested [as a way to remember him]. That rice is still good.

[When I was growing up], men riced together and women riced together. We never bought rice, and sometimes sold it for our school-clothes budget.

We offer tobacco each time we go ricing.

We have songs for many things. The main [point or them of these songs] is to give thanks. Giving thanks covers everything.

There is a [sacred] place which is high and rocky near Nett Lake. The legend of how [our people] found Nett Lake is that we came by way of the Lost River [crosses Highway 53] into Nett Lake.

Mesabi means giant. [There is a story] that a giant appeared [in some location on/near] the Laurentian Divide. We leave tobacco at a location along the Laurentian Divide [which is considered sacred, a rocky outcrop].

Logging was a key form of employment, but is not anymore. Trapping was [another way] people made a living.

Many Indians travelled from Nett Lake to Deer Lake, which was also considered part of the Nett Lake Reservation. People would go down to Deer Lake to trade fur. We had a fur company here. Archeologists [Bolton and Menk], at Farm Point, found a perfect arrowhead dating back about 1100 years.

We used to fish a lot on Nett Lake and Fish Creek. We fished suckers, little northerners, and perch. It's a shallow lake [so does not support large fish]. Rice cycles in period of three to four years. Each year we rice in different locations on Nett Lake depending on where the rice is located.

4. Henry (Hank) Goodsky, Pelican Lake ***(recorded intermittently by Rachel and Carole)***

I was born at Nett Lake and I taught in the "college system" for many years. The Pow Wow is the strongest teaching. [Here at the PowWow] we don't see sadness. Each and every one of us has a different spirituality from within. We can feel how strong it is.

Dancing is one of the biggest teachings. Old people, young people, different color people all come together. [At pow wow], we interact with other communities, other nations, other countries.

[My family] was allotted land outside of Orr. Mootz [Ron Geshick] sugars every year [with my brother].

The Thunderbird Trail [follows] the [Laurentian Divide] to Thunder Mountain and Thunder Bay.

[As a child], I started finishing rice near the dam, then parching rice. I was 13 years old. I learned the importance of earning money. Ricing was a blessing to us. We earned money from it for school clothes. We bought a car. We learned to take what we needed. We share wild rice amongst our family. My brother harvests it and my sister cooks it. Now we can see how much our traditions have changed. [Perhaps] 5% of [Anishinaabeg] understand our language and perhaps 2% speak it.

Some of our people could predict the weather. They could [look at birds, listen to them, watch them] and understand weather patterns.

Everything has a spirit.

Everything in the air is associated with the Thunder Spirit. We have "Underground Spirits." We have the Laurentian Divide Spirit. When we build a canoe, the canoe has a spirit. We bring it to life [as we build it.] We bless it. We look at spirituality as we do respect. We pass on [to younger generations] what we have learned. We collect learning.

Many factors contribute to "taking away our culture" [loss of our culture]. [In the past], powwows were very local. We did not have cars. We travelled by horse. We are trying to maintain our culture. But [the dominant culture has imposed] laws and rules on us. Laws get in the way…

We used to travel to Lac LaCroix [in Canada] in the Spring and come back in the Fall.

We could rice on the way home. We would pick blueberries. We travelled along the [boundary between the U.S. and Canada].

The eagle, turtle and bear are part of the spiritual world. The deer is a provider, of staple food.

June 19, 2011

5. Elaine Tibbetts, Bemidji (*recorded by Rachel and Carole)*

My Indian name is *Nishubequay,* which means 'a second lady is watching over you.'

[Many persons from Nett Lake] rice on/near the Vermilion river, Big Rice L., Twin Lakes (north of Keetac). We know there are trails that were created by Chief Bustakkogon up to Canada, from Big Fork to Aiken up to Canada.

When I was a little girl, sugaring was strong. More people are sugaring. We made syrup, cakes, sugar and powdered sugar [from syrup]. It is coming back again today. We also gathered pine cones and balsam boughs for sale to gardening businesses.

Wild rice is part of my way of living.

I was raised [by my parents to know/believe], you must go to the Baptist Church. [My family] had a strong connection to the Baptist Church. My parents did not drink.

Women also have roles as healers and can give medicine. But [working or healing] like Gilbert Smith here at this powwow, you don't see too many women doing that. Women [are seen to be] men's helpers. When [one sees/uses] the "Shaking Tent" or Jeesinigi, it is a Medicine Man who can use that to determine was is wrong with someone. The Shaking Tent levitates about three feet in the air.

I had a spiritual mentor named May. She was an advisor, a mother, a healer to me. When she was no longer here (died), I got her pipe. May taught me that you should add a small "mistake" to beadwork.

[I have been taught] that men have the black stone for pipes and women the red stone.
Jim Jackson said "What you've been given is not to be shown to others." That is why I do not carry my pipe in public. I only use it in my bedroom.

When someone dies, [one generally] puts cedar in the bottom of the casket. You provide food for them. You start a fire until they go into the ground. You leave a light on in the house.

It seemed that it was in the early 1980's that [our culture/ our ways] stopped being taught. But now [this culture/ these ways] are coming back.

The "Jingle Dress" is made out of aluminum snuff covers [or an equivalent]. It draws in strength and heals. It is a medicine dress.

The “Eagle Staff” is indigenous to the [Nett Lake/ Lake Vermilion] area.

I make “Swamp Tea” to heal any sickness. “Cedar Tea” is stronger and has more cleansing [properties].

When I was at UMD, I worked with Gordon Peters, an archaeologist on Pfeiffer Lake (located between the Y Store and Cook). We camped there for several weeks. We found [the remains] of birch bark canoes under rocks in three locations. We took water samples. We found beads, pieces of old knives and arrowheads. That was about 1986 or 1987.

6. Phyllis Boshey, Tower *(largely recorded by Carole)*

My family have been rice finishers for decades. [That is how we have made a living.] My family devised a type of threshing machine that increased our production. We supplied many businesses in the area. We have taught our children to do this. We have lived in Tower since about 1960 but we are from Nett Lake and have also lived in Duluth. My great-grandfather was John Beargrease.

Rice is used for offerings. It can be popped and mixed with maple sugar and blueberries.

I know that the Knott family used to rice down south near the [old LTV tailings basin] site. They likely went along the Embarrass River to rice, but not along the Partridge River. They riced in the upper St. Louis River in Seven Beaver’s Lake and other lakes in that area.

Vermilion PowWow Interview Questions

1. The “mosaic of important places” or “mental map” of each elder. Questions included places where each has lived, and where activities such as plant gathering, ricing, sugaring, hunting, fishing, took place. Where did parents and grandparents and other family members live and conduct these activities? How did the places and practices change over time?

2. The spiritual and cultural meaning of traditional activities including ricing, sugaring, plant gathering, hunting and fishing, to the individual and the community.

3. The ceremonial practices associated with landscape resources, such as tobacco offering.

4. General or specific comments about trails or routes within the study area or within other familiar landscapes.

5. Prominent natural features, especially the Laurentian Divide, outcrops, and vistas, and routes leading to sacred places along its length.

6. The traditional names of lakes, streams, outcrops, and hills, and if there are important views or viewsheds associated with these places.

7. Recollections of stories or oral histories of the area.

6.6 Ojibwe Band Histories: Bois Forte

W. R. Latady
Bois Forte Museum, Tower, Minnesota

The Ojibwe (or Chippewa) who occupy northeastern Minnesota were known as the Sug-wun-dug-ah-win-in-e-wug or men of the thick fir woods. French fur traders, called these people Bois Forte, or strong wood, the name by which they are still known. The Bois Forte Ojibwe, were the primary, if not sole, inhabitants of interior northeastern Minnesota from the 1730s through about 1870. The long-established network of trade among native Indian tribes determined the course of the fur trade. Europeans followed Ojibwe Indian traders west, moved along the same routes, used the same transportation, adopted the trading customs of the Indians and established forts at strategic points where tribal rendezvous were customary. Fur traders not only traveled the waterways but camped, fished, hunted or lived among local Bands resulting in not only swapping of furs and goods, but the exchange of ideas, languages, worldviews, commodities, practices, technologies, diseases, and genes (Richner 2002).

The Bois Forte Band of Minnesota Chippewa is derived from two separate groups; the Rainy Lake Bands and the Lake Vermilion Bands of Lake Superior Chippewa. The Lake Vermilion Bands formed a treaty relationship with the United States in 1854, and in 1866, the Rainy Lake Bands signed a treaty with the US Government. The treaties began the amalgamation of these two historical groups, comprised of 18 separate Bands, into the single Band existing today.

The Bois Forte band continued trading with the British long after United States Independence and did not participate in the early United States treaties. In the 1854 Treaty, their first, an undefined reservation was set aside near Lake Vermilion while a large portion of north central Minnesota remained Indian land. In return, the Band ceded land from Crane Lake to Duluth to Grand Portage, but retained the right to fish, hunt and gather in the ceded territory. Reports of gold on Lake Vermilion began to circulate just after the Civil War and lead to the Treaty of 1866. Designed to take control of the northern mineral lands, this treaty relinquished claims to a reservation on Lake Vermilion and established a reserve at Nett Lake. By Executive Order in 1881, a special reservation of 1000 acres was created at Lake Vermilion and a township at Deer Creek. The three sectors were subsequently allotted following the 1889 Nelson Act. The government did not make a serious attempt to move Bois Forte Band members to White Earth, designated as the homeland for any Indians still living in Northern Minnesota. Many Bois Forte Indians have extended family among Canadian Ojibwe.

In the latter half of the 19th century the federal government adopted a policy of assimilation, attempting to quash Indian traditions and force Indians to adopt Euro-American customs. Indian children were taken away from their families and sent to boarding schools where they were punished for speaking their native language while being taught western ways. Despite this callous policy, the Bois Forte people were able to hold on to their language, traditions and culture.

By the first quarter of the 20th century the federal government recognized that assimilation had failed and passed the Indian Reorganization Act of 1934 in order to strengthen Indian Governments. The Act lead to the formation of the Minnesota Chippewa Tribe, a political union of six Ojibwe Bands, which helped the Bois Forte Band further reinforce its own administration. The federal government followed with other policies including the American Indian Religious Freedom Act, the Indian Child Welfare Act, and the Indian Self-Determination Act, which initiated a new respect for Indian sovereignty and self-governance. In essence, these policies allowed Bois Forte, and other Indian Nations, to manage their own programs. By 1997, the Bois Forte Reservation Tribal Council had assumed full responsibility for the delivery of all government programs and services to its people.

References

Richner, Jeffrey J.
2002 People of the Thick Fur Woods: Two Hundred Years of Bois Forte Chippewa Occupation of the Voyageurs National Park Area. Midwest Archeological Center Special Report No. 3. National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

6.7

GLO Field Book Summaries

T59N, R12W January 1882

Exterior Boundaries and Subdivision Lines (Resurvey)

Surveyor's Notes (p. 99): "The surface of this Township is generally rolling with some swamps of considerable size in the southeast part of the Town. The soil is sandy and 2nd rate quality. The whole Township is densely timbered with Birch, Aspen, Fir, Spruce, Tamarac, and Jack Pine, and some Cedar and White Pine, with a dense [undergrowth] of the same and Hazel. The streams flow westward and are tributary to the St. Louis River."

"Note": (p. 149) This Township was all surveyed and all the exterior boundary lines were under my contract of May 13, 1881, in the months of July and August. And all my Fieldnotes and papers relating to said survey were lost in October last by the swamping of my canoe in descending the St. Louis River on my way to the Office. I were therefore obliged to resurvey the entire Township and the following are the true field notes of such resurveying made by me in the month of January 1882."

Plants Noted:
Jack Pine
Tamarac
Spruce
Hazel
Alder
Aspen
Birch
Fir

T59N, R13W October 1873

Surveyor's Note (page 73) "This Township contains no lands subject to cultivation, the South half being generally burnt over stony to light soil. The North half is principally swamp covered with a growth of small spruce, cedar, and tamarac trees. There is a small lake (meandered) in sec. 4 & 5 which contains about 45 acres. The banks are low and wet, the lake being surrounded by wholly by swamp. The Township is well watered. Whiteface River running from the NE corner to the SE corner and in sec. 33 forming a junction with Seven Beaver River, thereby forming the headwaters of the St. Louis River. The variation of the magnetic needle was rather changeable in the NW portion of the Township as will be seen by reference to notes of those lines."

Plants Noted:
Spruce
Birch
Tamarac
Pine
Cedar
Balsam
Aspen

T59N, R14W September-October 1873

Surveyor's Note (page 73) "This Township contains no lands subject to cultivation, the soil being light upon the uplands generally not to exced from 6 to 10 inches to solid or drift rock beneath the surface. The principal part of the southern portion of the Township has at some time not long past been burnt over and with the exception of scattering trees, the timber thereon is dead, and therefore useless. The Township is well watered, there being several small streams running out of it in both a southern and northern direction. "Masaba Heights, on the dividing ridge between the waters flowing North and South extends through the NW part of the Township. To the South of the Heights a changes in the variation of the magnetic needle is very frequent which would indicate a magnetic deposit in that portion to the south of the Heights. It is next to impossible to run a correct line by the needle in that portion. There is a small Lake or Pond in Sec 20 containing from 5 to 6 acres.

Plants Noted:
N. Pine
Pine
Birch
W. Pine
Cedar
Maple
Balsam
Balm of Gilead
Tamarac

T59N, R15W October-November 1878

Surveyor's Note (p. 157): The land in the township is above the common average in this section of the state. The "Massaba" range runs from northeast to southwest through the township and the land and timber on those hills is generally very good. The land north of the Massabi range is generally swampy and of little value. The township is well watered by the Embarrass River and the lake in Sections 18,19,29,30, 31, and 32, through which it runs, and by numerous small streams. The township is heavily timbered with Aspen, Birch, Pine, Spruce, Maple, Tamarac, Cedar and Fir generally of good quality.

Plants Noted:
Birch
Alder
Tamarac
Aspen
Fir
Spruce
Hazel

T60N, R15W October 1882

Surveyor's Note (original not located, from Trygg Abstracts [Chippewa Indian Claims Docket 18U, Royce Area #332]) "This Town lies on the Embarrass River which runs through the S.E. Part of the Town: and on the Pike River, which flows through the Western part of the town, and on the divide between the two rivers. The land on the rivers is very swampy; with swamps running nearly across from River to River. The upland, in most of the Town, is covered with coarse granite boulders of all sizes and shapes and the timber on the upland is nearly all fire killed and the land is now covered with a dense growth of young timber and brush--The soil is generally 3rd rate.

Plants Noted:
Red pine
Tamarac
Aspen
Birch
W. Birch
Aspen
Fir
Spruce
Alder
Hazel

T60N, R12W March -October 1872
Surveyor's Note (p. 61): "This Township is well timbered with Pitchpine, Spruce, Birch, Poplar, Norway Pine, White Pine, Tamarac, and Cedar, contains some good 2nd rate land for farming. Dunka River is from 60 to 100 links wide, has a sandy bottom, several rapids, a sluggish flow, the banks are low, it drains the swamps near the dividing ridge and empties about 5 chains north from the north townline into Birch Lake."

Plants Noted:
Birch
Pitch pine
Balsam
White pine
Maple
Norway Pine
Pitchpine
Tamarac
Spruce

T60N, R13W February 1872
Surveyor's Note (p. 62): "A part of Misabay Heights is situated in this Township and runs from the SW corner of it in northeasterly direction, the highest part of it may be 400 feet above the lowlands on either sides of the mountain range. The uplands along the southern slope of Misabay Heights are to the greater part 2nd rate land and adapted for cultivation. Timber chiefly White Pine, Norway Pine, Pitchpine, Birch, Poplar, Tamarac, & Spruce are in abundance. Along the northern slope there are large Granite blocks scattered."

Plants Noted:
Birch
Maple
Poplar
Pitchpine
Cedar
W. Pine
Tamarac
Balsam
Spruce
Norway Pine
Hazel

T60N, R14W 1872-73; 1882
Survey commenced September 18, 1882
(W. and S. boundary surveyed 1872 and 1873 by G. Stuntz/W.S. Hunanson; apparently resurveyed or recopied in 1882)

Trygg Abstract Notes (Chippewa Indian Claims Docket 18U, Royce Area #332)
(field book page not given, apparently copied from George R. Stuntz in Sept-Oct 1882)

General Description: "This township lies on the north slope of the Massaba Range on the upper valley of the Embarrass River. It is principally valuable for its tamarac and cedar timber, and for its large deposits of peat. It is nearly all swamp, resting on the bed of an ancient lake. The streams are all sluggish. Impenetrable thickets of Fir, and fallen timber, rendered the survey an exceedingly tedious process."

Claim shanty in Section 30 (in field book)
Remains of Indian encampment in Section 33 (no reference in book; source unknown)

Surveyor's Note (p. 157): The land in the township is above the common average in this section of the state. The "Massaba" range runs from northeast to southwest through the township and the land and timber on those hills is generally very good. The land north of the Massabi range is generally swampy and of little value. The township is well watered by the Embarrass River and the lake in Sections 18,19,29,30, 31, and 32, through which it runs, and by numerous small streams. The township is heavily timbered with Aspen, Birch, Pine, Spruce, Maple, Tamarac, Cedar and Fir generally of good quality.

Plants Noted:
Alder
Fir
Maple
Hazel
W. Pine
Cedar
Tamarac
Aspen
Birch

B. Pine
Spruce
willows

T60N, R15W October 1882

Surveyor's Note (original not located, copied from Trygg Abstracts [Chippewa Indian Claims Docket 18U, Royce Area #332])

"This Town lies on the Embarrass River which runs through the S.E. Part of the Town: and on the Pike River, which flows through the Western part of the town, and on the divide between the two rivers. The land on the rivers is very swampy; with swamps running nearly across from River to River. The upland, in most of the Town, is covered with coarse granite boulders of all sizes and shapes and the timber on the upland is nearly all fire killed and the land is now covered with a dense growth of young timber and brush--The soil is generally 3rd rate.

Plants Noted:
Tamarac
Spruce
Birch
Red Pine
Pine
White pine
Aspen
Fir

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6.8 Corps St. Paul District Office Memorandum

MEMORANDUM 14 January 2010

FROM: Brad Johnson, Cultural Resource Manager OP-R
THROUGH: Tamara Cameron, Branch Chief OP-R
TO: Jon Ahlness, Project Manager OP-R

SUBJECT: Polymet Northmet Project: Tribal Consultation and Historic Properties, Treaty Resources, and Corps Tribal Trust.

Background
Over the last couple of years, the Regulatory Branch held a series of consultation meetings with the Grand Portage, Bois Forte, and Fond du Lac bands to discuss the identification of historic properties of religious and cultural significance to the Bands. As a result of those meetings, additional information and field survey needs have been identified, which will be necessary to satisfy the Corps' responsibility under section 106 of the National Historic Preservation Act (NHPA). This information will also be used in satisfying the Corps' tribal trust responsibilities.

Pursuant to our responsibilities under section 106 of the NHPA, the Corps has a responsibility to make a reasonable, good faith effort to identify historic properties of traditional religious and cultural significance to Indian tribes, consider the effects resulting from activities the Corps authorizes on those properties, and provide the Advisory Council on Historic Preservation an opportunity to comment in regard to such activities.

The Corps also has a responsibility to consider the effects of activities that the Corps authorizes on treaty resources, which may not qualify as historic properties, and to consider the potential for those activities to impinge on a tribes ability exercise treaty rights.

The following tasks will provide information necessary to identify, historic properties and treaty resources. To date, cultural resource identification has focused on mining properties and archaeological resources, not historic properties of significance to the consulting Bands or treaty resources.

Proposed Tasks

1. Implementation of a plan for identification of historic properties of traditional religious and cultural significance to the Bands. This plan is the result of consultation between the Ojibwa Bands and the Corps. See attached plan provided by Bois Forte Band.

- The plan drafted by Bois Forte will be adapted for use by the Grand Portage Band and the Fond du Lac Band.
- This plan involves interviews with Band members, which the Bands themselves will conduct and site visits, which will be identified through the interview process.
- The Bands are uniquely qualified to conduct these interviews.

- This effort will require providing compensation to the Bands from the applicant for this service.
    - If the Bands do not provide this information, the Corps is still responsible for identification of these historic properties and Polymet will need to contract the services of a qualified consultant to conduct the interviews.
- Compile a report on the results of the interviews.

2. The applicant must retain the services of a qualified historian to provide baseline ethno-historical research pertaining to Ojibwa use of the APE including a cultural landscape assessment of the project area and surrounding vicinity. This will involve the following:

- Participation in tribal consultation meetings conducted by the Corps as appropriate.
- Background research to identify cultural features and natural landscape features, to include at a minimum the original government land office survey notes and maps on which the Trygg Maps are based, other historic maps of the project area and surrounding vicinity, relevant historic documents and literature.
- Interviews with Band members as appropriate.
- The applicant's consultant will produce a final report that will include the background research, field investigations, and the results of interviews with Band members as appropriate.
- The applicant's consultant shall coordinate this work effort with the Corps to define the specific requirements.

3. The applicant's consultant shall conduct a field survey during the spring of 2010 to attempt locating the cultural and natural features identified during the research efforts outlined above and assess their integrity. Field survey will include a survey of areas adjacent to the tailings basin and all other areas where ground disturbing activities will occur and previous survey was not conducted.

- The Corps will provide the applicant with the specific requirements of this investigation after reviewing the results of the interviews conducted by the Bands and the background research conducted by the Polymet's consultant.

4. The applicant shall implement the plan for the identification of plant communities that was developed by the Corps. This work will be done to provide baseline data for the evaluation of project impacts to treaty resources and also to facilitate the identification of historic properties.

- Classification of plant communities by identification of the canopy species through interpretation of aerial, infrared photography.
- Identification of understory, shrub, and herbaceous layers using existing plant lists for specific community types.
- Groundtruthing to determine accuracy of methods and gather more detailed information on areas of concern to the consulting Bands.
- See attached plan for more details.

Implementation of Tasks

1. Jon Ahlness will inform the applicant of all the above required actions.
   - Coordinate meeting with applicant and applicant's consultant to implement Task 2 and discuss implementation of Task 3. Required attendees are the applicant, the applicant's consultant, B. Johnson and J. Ahlness.
   - Provide a scope of work to the applicant for implementation of Task 4.

2. Catherine Voce will coordinate meeting to kick-off implementation of Task 1. Required attendees will be J. Ahlness, B. Johnson, and C. Voce from the Corps, the THPOs and other tribal representatives as appropriate from the Ojibwa Bands, and the applicant and applicant's cultural resource consultant as appropriate. The meeting will be at the location requested by the consulting Bands within proximity of the Corps offices or the project area.

Tamara E. Cameron
Chief, Regulatory Branch

B. Johnson OP-R 2/18/10
R. Augustin OP-R 2/18/10

PLANT COMMUNITY IDENTIFICATION AND EVALUATION IN AREAS DIRECTLY AND INDIRECTLY IMPACTED BY THE PROPOSED POLYMET, NORTHMET PROJECT

PREPARED BY ST. PAUL DISTRICT, CORPS OF ENGINEERS

Background

The U.S. Army Corps of Engineers (Corps) and the Minnesota Department of Natural Resources (MnDNR) are preparing a joint federal-state environmental impact statement (EIS) for the proposed NorthMet project (Project) near Hoyt Lakes and Babbitt in northeastern Minnesota. As part of the evaluation of impacts to treaty resources and historic properties, the Corps has determined there is a need for the classification and evaluation of wetland and upland plant communities that may be directly impacted or indirectly affected by the project. Impacts could result directly from Project activities in the footprint of the Project or indirectly from groundwater drawdown, fugitive dust, or degradation of water quality resulting from the Project.

Natural and cultural resources are inseparable in traditional Native American culture. At or near the Project site, there is evidence that there were maple-sugaring areas as recently as the 1950s. Additionally, the Project site, and much of the area potentially affected by the project, lies within the 1854 Ceded Territory, which was ceded by various Lake Superior Chippewa bands under the 1854 Treaty of LaPointe. The Ceded Territory is a large area covering most of the arrowhead region northeast Minnesota, within which the Grand Portage Band of Lake Superior Chippewa, Bois Forte Band of Chippewa, and Fond du Lac Band of Lake Superior Chippewa (Bands) 1854 Ceded Territory retain usufructuary rights, or the right to hunt, fish, and gather. The 1854 Ceded Territory is of importance to the Bands for traditional plant and medicine harvest, as well as hunting.

Purpose

The classification of plant communities will provide baseline information to help characterize the area that may be affected by the Project and identify specific areas of natural resources that are culturally-significant to the Bands and assess the potential Project impacts to those resources and the 1854 Ceded Territory. As a federal agency, the Corps has a unique legal relationship with federally recognized Indian tribes that is expressed as a fiduciary responsibility under the federal trust doctrine. The Corps must consider the effects of its actions on treaty resources, treaty rights, as well as historic properties, and must also consult with the Bands regarding any potential mitigation as appropriate.

Scope of Investigations

Plant community identification will be completed using a phased approach. Figure 1 defines several areas: the pit area, the area of the proposed land exchange, and two areas referred to as Initial Study Area One and Initial Study Area Two, and a broader area that

is a portion of the Partridge River watershed. Initially, a detailed classification of plant communities based on canopy species will be completed in the initial study areas.

These areas are a portion of a larger area referred to as the area of potential effects (APE). The APE is a federally required designation for purposes of the identification of historic properties. In this case, the APE outside of the Project area itself, was based primarily on the potential for effects to ground and surface waters. Based on current modeling, groundwater effects are not predicted to occur beyond the initial study areas. The potential for visual, atmospheric, and audible effects is limited to a much smaller portion of the APE centered on the project area itself.

Therefore, the Corps will focus classification efforts on the initial study areas and assess the need for further classification of plant communities based on the results of the initial study, an assessment of project effects in the larger area based on the completed analyses for the Final EIS, and consideration of other information submitted to the Corps for review. The APE may be refined based on the review of this information.

Classification

Classification of plant communities shall be accomplished through interpretation of available color infrared (CIR) aerial photography to map plant communities. This will add to the existing knowledge provided by vegetation cover maps, U.S. Forest Service stand data, National Wetland Inventory (NWI) maps, and topographic maps. Specifics for the evaluation are defined as follows:

1. PolyMet Mining, Inc. will promptly conduct the required plant community classification and provide a report with the findings to the Corps and all cooperating agencies (including all interested Indian tribes) for further evaluation within 30 days of completion.

2. The starting point for the classification of plant communities will be vegetation mapping by the National Wetland Inventory and the U.S. Forest Service stand data, as well as topographic maps.

3. The Report must include interpretation of stereo pairs (60% overlap) of color infrared (CIR) aerial photography to map plant communities through the identification of canopy species within the initial study areas indicated on Figure 1. This must include, at a minimum, the 2005 CIR photography by the MnDNR, Forestry Division. Additional aerial photography should be used as warranted. A contact for the MnDNR CIR photos is Mike Happus of the MnDNR Forest Inventory Office in Grand Rapids, Minnesota. His telephone number is (218) 327-4449 ext. 223.

4. The mapping of wetland plant communities will use the Eggers and Reed (1997) nomenclature as well as the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MnDNR

2003) to identify the broad community types and identify the associated herbaceous, shrub, and subcanopy plant species.

5. Mapping upland plant communities will use the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MnDNR 2003) to identify the broad community types and the associated herbaceous, shrub, and subcanopy plant species..

6. The scale of the mapping must be 1 inch = 1,320 feet or greater detail.

7. A table will be provided that identifies individual plant communities by type and size. Another table will also be provided that summarizes the area covered by different plant community types within the study area.

Review of Plant Community Classifications

1. All cooperating agencies and interested Indian tribes will have 30 days from the date of receipt of the Report to independently review and submit written comments on the Report, including areas of concern and areas to be ground truthed.

Field Identification

1. Based on the results of the plant community classification and review by the cooperating agencies, consulting Bands and the Corps, the Corps shall consult with the Indian tribes to identify specific areas for field identification of plants. Consultation shall involve an ecologist/botanist that is familiar with the Native-American-language, or Ojibwemowin, plant names to facilitate consultation.

2. Field identification will serve three purposes.

   a. Field identification of plants will be used to ground truth community classifications and determine the extent to which ground, shrub, and subcanopy layers can be inferred from the canopy species used to classify plant communities.

   b. Field identification will provide more detailed information on areas that the Bands believe are culturally sensitive.

   c. The information provided by the field identification may suggest other areas that should be ground truthed or further investigated.

3. Field identification will focus on the mine pit area and the proposed U.S. Forest Service land exchange area.

4. Field identification shall involve representatives from the Bands and an ecologist/botanist that is familiar with the Ojibwa language. The representatives from the Bands and an ecologist/botanist will collaborate to identify plants with their Ojibwemowin name as well as English and Latin plant names.

5. The results of the field identifications shall be presented in a report that details the site conditions, the extent and importance of resources present, and field sketch maps keyed to the maps provided in the report on the plant community classifications.

Evaluation

The results of the plant community classification and field identification will be the basis for evaluating the cultural significance of the natural resources potentially affected by the Project within the larger contexts of the Partridge River Watershed and the 1854 Ceded Territory. This study will also facilitate the identification and evaluation of historic properties within the APE. Effects may result from changes to critical habitat, habitat segmentation, or changes in plant cover or forest type. This evaluation will provide a basis for consideration of environmental mitigation measures. This will also provide the consulting Bands a reasonable opportunity to identify any concerns, advise on the identification and evaluation of historic properties and treaty resources, articulate views on the Project's effects on historic properties, treaty resources, and treaty rights, and participate in the resolution of adverse effects.

6.9 M. Loftus, "A Late Historic Period Chippewa Sugar Maple Camp," in *The Wisconsin Archaeologist* 58 (1977), 71-76.

A LATE HISTORIC PERIOD CHIPPEWA SUGAR MAPLE CAMP

Michael K. Loftus
Evansville, Wisconsin

ABSTRACT

Examination of the site context and associated artifacts of a Late Historic Period Chippewa sugar maple camp indicates that procedures and artifacts used in the production of maple sugar and syrup have changed relatively little since the Early Historic Period. Description of the site will hopefully aid in the identification of such seasonally specialized activity in an archaeological context.

The site is a Late Historic Period Chippewa sugar maple camp located in the SW 1/4 of the SW 1/4 of Section 11, T59N, R14E, St. Louis County, Minnesota, on land owned by The Erie Mining Company, and was examined in August 1969. The site is located in a large sugar maple (*Acer saccharum*) grove which covers an area of approximately 80 acres primarily in the SW 1/4 of Section 11 (Fig. 1).

The floral community is dominantly maple (*Acer saccharum*) with some birch (*Betula papyifera*), basswood (*Tilia americana*), and pine (*Pinus* sp.). The ceiling is approximately 50-60 feet and the understory consists of maple and shade tolerant balsam (*Abies balsames*). According to Mr. Dickson, the Erie Forester, the trees in the grove are about 100 years in age with some up to 200 years of age. There is a maple to maple succession in this area and apparently the fires which periodically sweep through this area have missed this particular stand. It may seem fortuitous that fires have missed this stand but the reason may be due to the utilization of the grove by the Chippewa. In addition to the very dense ceiling which permits the growth of only shade tolerant species, the Chippewa probably utilized much of the non-maple wood sources to fuel the fires in the sugar making process (Panshin in Quimby, 1966: 175).

The site is located in an area that seems to have been rather heavily utilized by the Chippewa during the latter part of the nineteenth century.

According to surveyors' notes made in 1858, there were two sugar maple camps located in T57N, R6W, and additional maple camps in T57N, R7W. Surveyors' notes from 1882 indicate the remains of an Indian encampment approximately two and one-half miles northwest of the site. This encampment was located on an Indian trail which ran east to Lake Vermillion. The Lake Vermillion trail passes within a mile, to the north, of the grove. Another north-south trail from the Embarass River to the Lake Vermillion trail passes within a mile to the east of the site. Secondly, another trail

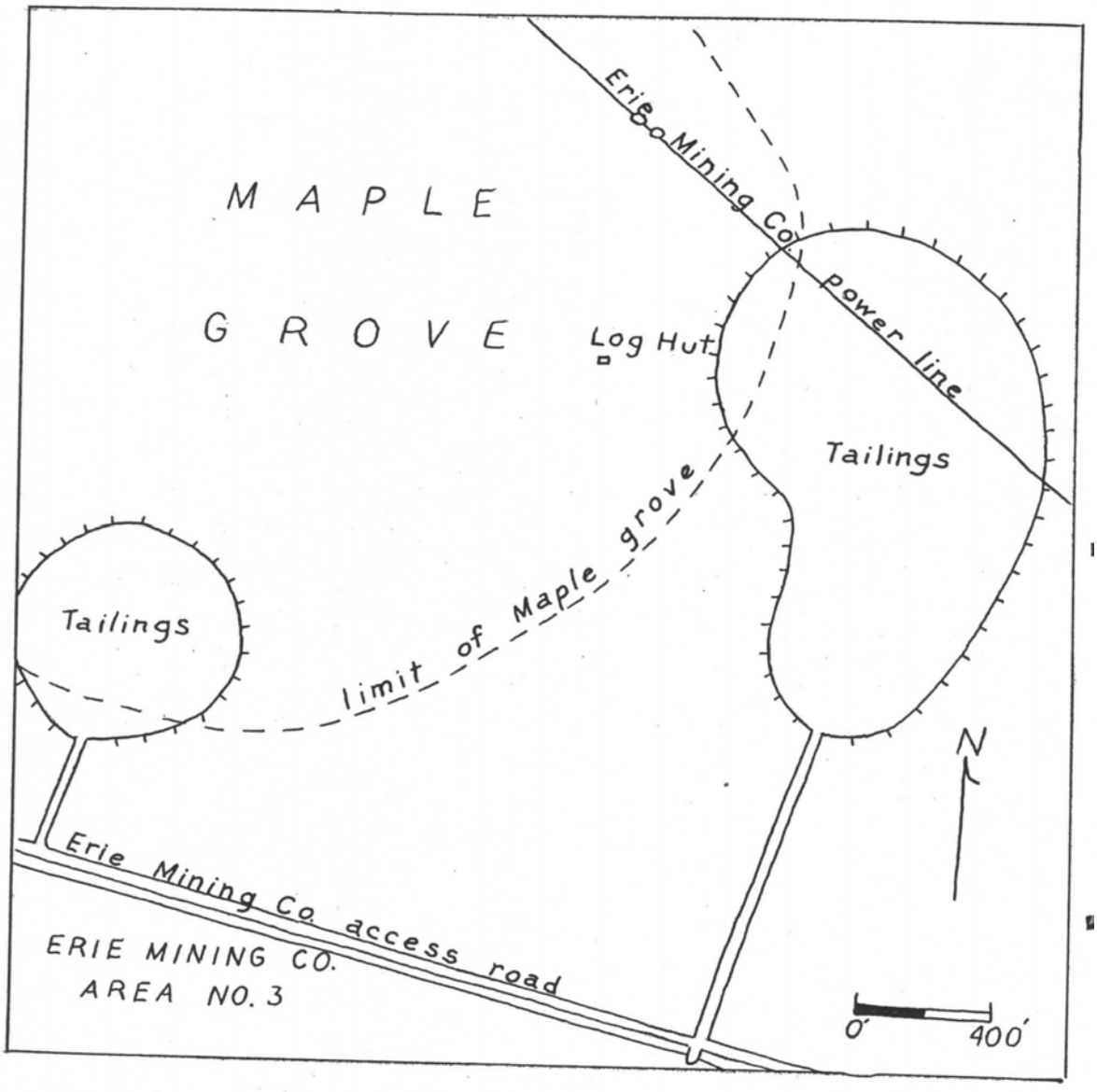

FIGURE 1

SKETCH MAP OF MAPLE GROVE

from the St. Louis River, to the south, which also intersects with the Lake Vermillion trail, passes within a mile to the west of the sugar maple grove (Trygg 1966:Map sheet #17).

This information corresponds quite well with that given by local informants, who suggested that movement to the grove had been from the Embarass-Wine Lakes west of the grove and from the Embarass River to the north.

While it is difficult to establish the period during which utilization of the grove began, the age of the trees in the grove and the proximity of the site to well defined trails would suggest that utilization may have begun during the late eighteen-hundreds.

The grove has been extensively utilized as a sugar maple source during Late Historic times. According to local informants the Chippewa used the site as late as the 1930's. The trees show numerous scars as a result of the tapping, some having as many as six scars. The scars are usually diagonal and approximately 4-5 inches in length with some intersecting another forming a V, possibly as an aid in directing sap flow. Wooden wedges were inserted in the slashes and/or notch of the V allowing it to drip into birchbark collection baskets (Ritzenthaler and Ritzenthaler 1970:13-14; Quimby 1966:174, Fig. 33).

The major area of activity and artifact concentration centered around a small log hut in the interior of the grove. The hut is constructed of pine logs put together with round iron nails. Its dimensions are 4 1/2 feet high at the peak of the roof, 4 feet high at the top of the walls, and 6 feet wide by 8 feet long. Apparently there had been attached to the back of the hut a crude lean-to which has since collapsed. This hut probably represents the storage place for sugaring equipment (Ritzenthaler and Ritzenthaler 1970:13). The area of the hut, particularly the front and rear, was scattered with debris consisting of metal pots and pans and various other containers, birchbark baskets and wooden wedges. Inside the hut or within 10 feet of the outside of the hut were approximately 50 birchbark baskets in various stages of deterioration. The floor of the hut was literally covered with such baskets.

According to informants, caches of stockpiled baskets and metal containers used in sugaring were also located in the grove. These caches were not located during the survey of the area.

ARTIFACTUAL MATERIALS

Birchbark baskets: The baskets were found individually or in sets, one basket nested inside another. Three sets of baskets were recovered for more detailed study. Two sets contained three baskets and one contained four. The baskets were constructed by folding the birchbark sheets at the ends and perforating the folds so as to leave no holes in the construction save the ones at the end where the folds were overlapped. The baskets are roughly oval in shape and have five perforations in each end where the baskets were folded. Basswood fiber was passed through the perforations

and knotted to secure the basket in its proper shape. One of the baskets still has the basswood fiber tied through perforations at both ends and another has some fiber still in place at one end. The baskets varied in size the largest being 16 inches long by 9 inches wide, and was 4 inches deep. The smallest basket was 8 1/4 inches long by 7 1/4 inches wide, with a depth of 3 1/4 inches (Fig. 2).

Paddles: These items are basswood wedges which were inserted in the slashes in the trees to direct the sap flow. Cedar spiles were also used for this purpose (Ritzenthaler and Ritzenthaler 1970: 13). In some cases where scars were in the form of V's it is possible that two wedges were set at a diagonal to form a trough down which the sap would flow. Of thirteen specimens of these paddles, the longest was 6 1/4 inches long, width at base 1 1/2 inches, width at top 2 1/2 inches, thickness is approximately 3/16 inches. The shortest specimen examined was 5 1/2 inches long, width at base 1 1/2 inches, width at top 2 1/2 inches, and thickness 3/16 inches. On all specimens the edges were beveled approximately 1/2 inch from the widest end (Fig. 3).

SUMMARY

This site is significant in that it allows for a comparison of Late Historic Chippewa sugaring practices with those of the Early Historic Period. It would appear that some of the materials used in the sugar maple camps had changed relatively little over time.

Description of the site will also hopefully aid in the identification of such seasonally specialized sites in an archaeological context. Indications of site function in terms of such a site would include: a relative lack of food refuse, since the Indians would have been subsisting primarily on sugar and dried meat, extensive hearth remains from all the boiling of maple syrup, and if the site was utilized annually by several families, numerous lodge remains (Quimby 1966:178). Additionally, evidence of a small structure for the storage of sugar mapling equipment and the recovery of such items as sap collection baskets and paddles would serve to suggest sugar mapling as the primary site activity.

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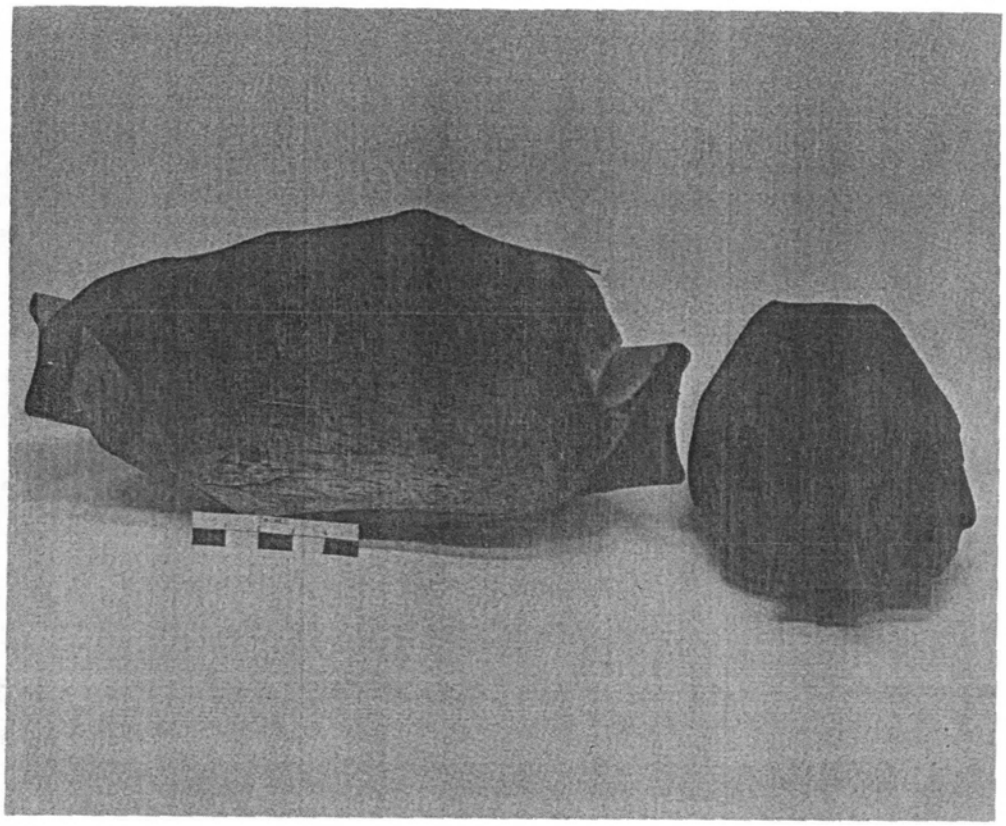

FIGURE 2

BIRCHBARK BASKETS

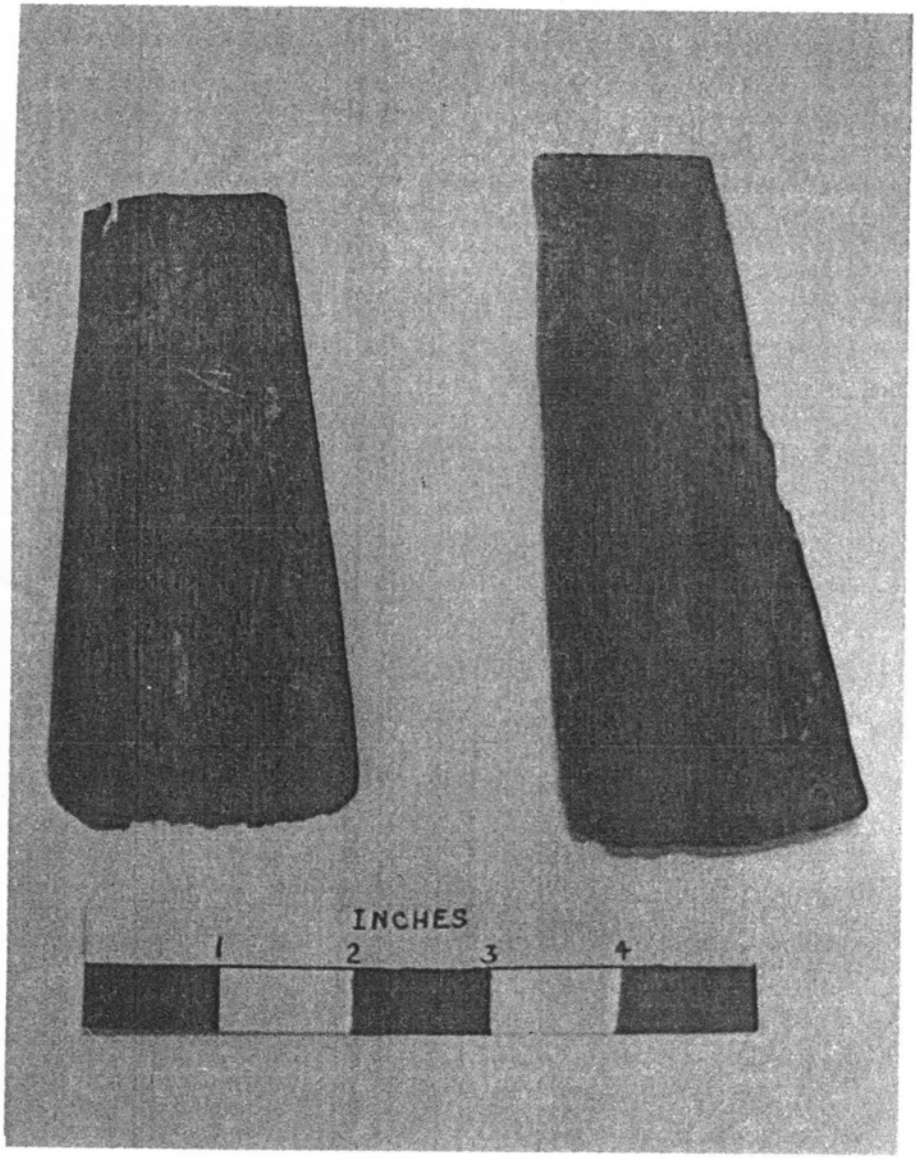

FIGURE 3

BASSWOOD PADDLES

6.10 Multiple Property NRHP Inventory/Evaluation Forms

As explained in NRHP Bulletin 16b, related significant properties can be grouped, and themes, trends, and patterns of history shared by the properties can be organized into historic contexts. The Multiple Property Listing (MPL) is especially appropriate for evaluation of broad regional landscapes where additional information may be added for similar but distant properties that share the same historic context.

The name of the thematic group, denoting the historical framework of nominated properties, is the Multiple Property Listing. When nominated and listed in the National Register of Historic Places, the Multiple Property Documentation Form (MPDF), together with individual registration forms, constitute a Multiple Property Submission (Lee and McClelland 1999 rev).

Proposed Multiple Property Listing Name

Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing

Historic Contexts and Property Types

Context: Ojibwe Botanical and Plant Resources
Sub-Context: Maple Sugar
Associated Property Type:
Spring Mine Lake Sugarbush (SL-HLC-017)
Context: Indian Trails
Associated Property Type:
Lake Vermilion-to-Beaver Bay and New Trail Intersection (SL-HLC-018)
Lake Vermilion-to-Beaver Bay Trail Corridor (SL-HLC-019)
Context: Topographical Features
Associated Property Type:
Overlook in Section 3 of T59N, R14W (SL-HLC-016)
Missabe Widjiw Viewshed (SL-HLC-015)

Inventory Forms:

6.10.1 Spring Mine Lake Sugarbush (SL-HLC-017)
6.10.2 Lake Vermilion-to-Beaver Bay Trail Corridor (SL-HLC-019)
and Lake Vermilion-to-Beaver Bay Trail and New Trail Intersection (SL-HLC-018)
6.10.3 Overlook in of Section 3, T59N, R14W (SL-HLC-016) and *Missabe Widjiw* Viewshed (SL-HLC-015).

Figure numbers in 6.10.1-6.10.3 are independent of others in the Cultural Landscape Report and Appendix. See also Report Map 21.

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6.10.1

Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing

Property Name:
Spring Mine Lake Sugarbush (SL-HLC-017)

Location:
NW 1/4, Section 11 T59N, R14W
Hoyt Lakes, St. Louis County, Minnesota
UTM: Z15 568527E 5272935N (centroid)
NAD 83

Date of Survey: various, 6/2010-6/2012

Survey by: B. Johnson, Consulting Ojibwe Band Members, other participants (see NorthMet Project Cultural Landscape Study 2012)

Description

The Spring Mine Lake Sugarbush is located near Spring Mine Lake in the NW 1/4 of Section 11 of T59N, R14W. This sloping, approximately 80-acre site appears to be a natural maple-basswood stand that has been managed to increase sugar maple coverage and to exclude non-maple tree species. It is southwest of Spring Mine Lake, a natural-ore mine opened in 1906 and now a water-filled pit. Spring Mine was opened in 1906 and operated until 1910 (van Brunt 1921:706). Subsequently the Erie Mining Company and its successors owned the property.

The sugarbush ("sugar camp") is south of the intersection of what J. W. Trygg labeled the Lake Vermilion to Beaver Bay Trail" and east of what he labeled the "New Indian Trail." The New Indian Trail was also documented by GLO surveyors (1967:17; Map 18). Most of the site is north of a former power line corridor that appears as a vegetated, V-shaped linear feature on aerial photographs. A recent firebreak had been bulldozed through a portion of the sugar bush from the former power line corridor north. The break appears to have followed an existing road.

The sugarbush is a mesic-hardwood community type. Specifically, it is a rich maple-basswood forested community with a relatively open understory and diverse herbaceous groundcover. Review of forestry data compiled by MNDNR suggests that vegetation in the sugarbush has been artificially manipulated, most likely by Native Americans. Sugar maple (*Acer saccharum*) abundance in the sugarbush site is much higher than what would typically be found in maple-basswood communities in the region. The sugarbush site is strongly dominated by sugar maple, with the usual associated tree species basswood and yellow birch almost entirely missing.

The strong dominance of sugar maple at this site, along with the near-absence of basswood and yellow birch, suggests that the distribution and abundance of canopy tree species has been managed to select for maple and against non-maple tree species. This is consistent with the past use of the area. Managing the sugarbush site for maple syrup production would result in the species composition and abundance that is currently present, since non-maple species would obviously not contribute to syrup production and would likely be removed to create space for additional sugar maple trees.

Many of the sugar maples have misshapen boles, with flattening and widening of the bole between

approximately four to eight feet from the ground. The centers of these flattened bole sections are depressed and cracked. Many show interior decay, and several trees have snapped and fallen at the point of decay. This anomaly in a stand of sugar maple is the result of prolonged repeated tapping of the tree for syrup, with the entry point of the tap creating a structural weakness in the tree trunk and providing an avenue for secondary infection.

Based on 2010-2012 archaeological fieldwork, the Spring Mine Lake Sugarbush appears to be a large multi-component site with evidence of maple sugaring activity from a range of time periods. The remains of a log structure are located near the south edge (Figures 2, 3, 5, 6). An adjacent scatter of pails and buckets were observed; they appear to date no earlier than the 1920s because of their crimped rather than soldered seams. Stones had been placed at the entrance, but there were no other associated features such as fire hearths or structures. Several activity areas were identified (Figures 5-8). At one, broken window glass was present, suggesting that a structure may have been present at one time. Nearby in the roots of a large maple tree there was an artifact scatter consisting of tobacco cans, shoe remains, and bottles. Numerous metal barrel staves and a set of nested shovels were also in this activity area. No trails, other than the older road, which the fire break followed as mentioned above, or other processing/sugar camp areas were observed to date (B. Johnson 2012).

History

Photographs and other documentation indicate that the sugarbush appears to have been well known to the mid-20th century Ojibwe community as well as Erie Mining Company mining personnel. Bois Forte Band elder interviews confirmed the location of this camp (Latady and Isham 2011:4, 6.5.1). A small photograph in the possession of an elder shows three people in a hardwood forest and is labeled:

> "The individuals are standing in front of an arbor and holding items associated with making maple sugar. The caption on the reverse, printed in block letters with a pencil reads MA & PA & ME SUGAR MAKING IN SPRING MINE MESABA, MINN, 1942" (Latady and Isham 2011:4).

In 1969 Michael Loftus of Beloit College in Beloit, Wisconsin examined the site. He was directed to this location by Erie Mining Company staff. His report, published eight years later, notes that he spoke with local informants who suggested that Ojibwe "movement to the grove was from the Embarrass and Wine Lakes west of the grove, and from the Embarrass River to the north" (Loftus 1977:73).

Loftus described the site as a "Late Historic Period Chippewa Sugar Maple Camp," and noted that the trees within the grove were between 100 and 200 years old (Loftus 1977:73). He observed the log structure ruin described in 2010 as constructed of pine logs secured with round iron nails. The 6' x 8' log structure, by 2010 a ruin, measured 4 ½ feet high at the roof peak. A small collapsed lean-to was also observed. Stockpiled birchbark baskets and basswood wedges or paddles were interspersed with metal pots and pans within the structure, and "various other containers" (Loftus 1977:73). Loftus observed approximately 50 birchbark baskets: "the floor of the hut was literally covered with such baskets" (Loftus 1977:73). Loftus concluded that the site was significant because it allowed "for a comparison of Late Historic Chippewa sugaring practices with those of the Early Historic Period." He concluded that it "would appear that some of the materials used in the sugar maple camps had changed relatively little over time" (Loftus 1977:74).

3.0 Significance

When I was a little girl, sugaring was strong. We made syrup, cakes, sugar and powdered sugar [from

syrup]. It is coming back again today. More people are sugaring.

Elaine Tibbetts, June 19, 2011 (Walker and Zellie 2011, 6.5.3)

Maple sugar is regarded by Ojibwe as a gift from the Creator, as food, and as an offering (Ron Geshick, June 18, 2011; Walker and Zellie 2011, Section 6.5.3). Bois Forte, Fond du Lac and Grand Portage elders concur on its traditional cultural significance. Despite significant decline in the number of producers and increased mechanization, maple syrup continues to be made for home and family consumption by Ojibwe across the Western Great Lakes region. The sugarbush "continues to serve as an important symbolic element in the development and maintenance of an Indian identity, solidifying the relationships of individuals and communities in the present with their land and their ancestors" (Thomas 2004:ii).

Late March and early April in northern Minnesota is known as *Izhkigamisegi Geezis*, the Moon (month) of boiling. Maple sugaring took place at family "sugar bush" locations (sugar maple, *Acer sacharum*). The sugar, in syrup or granular form, provided seasoning for grains and breads, stews, teas, berries, and vegetables. During the 1920s Frances Densmore recorded the sugaring stories of Mille Lacs Band Ojibwe. Nodinens (Little Wind), described her childhood in a late winter hunting camp that ended with tapping a grove of sugar maples. The enterprise she described was led by women; her mother's brass kettles were obtained from an English trader and tin pails from an American trader. The boiling kettles and sugaring equipment were cached under birch bark and left in the sugarbush after the end of the season (Densmore 1929:120-23; Figure 16).

It takes about 30 to 40 gallons of maple sap to make one gallon of syrup, and the operations were extensive: in the case of Nodinens, six families tapped about 2,000 trees. Two to ten tappings could be made in each tree. Thick syrup for hard sugar *(zhiiwaagamizigan)* was scooped before it granulated from the final boiling kettle, and poured onto ice or snow to solidify. It was poured into molds or packed tightly into shells or birchbark cones *(zhiishiigwaansag)* whose tops were sewn shut with basswood fiber for storage. When the boiled sugar was about to granulate in its final boil-down, it was poured into a wooden sugaring trough, made from a smoothed-out log. It was stirred there to granulate it, and rubbed with ladles and hands into sugar grains, *ziinzibaakwad.* Warm sugar was poured from the trough into birchbark makuks. This form was used for seasoning and stirred into teas (GLIFWC 2006). Maple sugar was also among goods traded to late 19th-century lumber camps, early Euro-American farmers, and other markets (McClurken 2000:16).

In a description of 19th-century sugaring at Grand Portage, Thomas (2004:90) refers to N.H. Winchell's 1911 account of the sugaring process published in the *Aborigines of Minnesota* (Winchell 1911). Winchell noted the Speckled Trout Lake sugarbush as "celebrated," and various other records note other sugaring camps along a Grand Portage sugarbush trail (Thomas 2004:90). Some families produced large volumes of sugar, and families moved into the sugarbush for two or three weeks. The sugar and candy lasted throughout the year. Through the first half of the 20th century, the Grand Portage Ojibwe "continued to tap trees with an axe and use a wooden flat tap, collecting the sap in birch bark containers set at the base of the tree" (Thomas 2004:90). This description corresponds to the containers and paddles found at the Spring Mine Lake sugarbush in 1969 (Loftus 1977:73). Commercial production began in the 1950s, which included operation of a processing plant on the Grand Portage Reservation between ca. 1957 and 1972 (Thomas 2004:91;96).

NRHP Evaluation

Integrity

NRHP Bulletin 38 notes that following determination that a natural feature possesses enough association with significant tradition or use, integrity must be considered (Parker and King rev. 1998).

In order to be eligible for inclusion in the Register, a property must have "integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR Part 60). For properties of spiritual and cultural significance to Indian tribes, two questions about integrity are important. The first asks, "does the property have an integral relationship to traditional cultural practices or beliefs?"

Bulletin 38 states,

> If the property is known or likely to be regarded by a traditional cultural group as important in the retention or transmittal of a belief, or to the performance of a practice, the property can be taken to have an integral relationship with the belief or practice, and vice-versa (Parker and King rev. 1998).

The second question asks, "is the condition of the property such that the relevant relationships survive?" A property that once had traditional cultural significance can lose such significance through physical alteration of its location, setting, design, or materials, or through alteration of setting and environment.

Bulletin 38 notes,

> The integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation (Parker and King rev. 1998).

If the property has lost integrity for its spiritual and cultural associations, it may still retain archeological deposits significance for their information content.

Application of NRHP Criteria

The NRHP Criteria can be applied to properties that retain adequate integrity. The property must meet one of four criteria (Section 1.3.3).

Criterion A. Association with events that have made a significant contribution to the broad patterns of our history.

Bulletin 38 notes that the actual time a traditional event took place may be ambiguous; in such cases it may be impossible, and to some extent irrelevant, to demonstrate with certainty that the property in question existed at the time the traditional event occurred. As long as the tradition itself is rooted in the history of the group, and associates the property with traditional events, the association can be accepted.

Criterion B. That are associated with the lives of persons significant in our past.

Bulletin 38 notes that this criterion should be interpreted with reference to the people who are thought to regard the property as traditionally important. The word "persons" can be taken to refer both to persons whose tangible, human existence in the past can be inferred on the basis of historical, ethnographic, or other research, and to "persons" such as gods and demigods who feature in the traditions of a group.

Criterion C. Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

Bulletin 38 notes that since this applied to properties that have been constructed, in general it is not applicable to natural features. One exception would include features such as pictoglyphs or pictographs

(high artistic values). Another would include groupings of special plants; as individual objects they lack distinction, but the larger entity of which they are a part may be of prime importance in the area's history (Parker and King rev. 1998).

Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

Bulletin 38 notes that a property's history of yielding, or potential to yield, information—if relevant to its significance at all—is secondary to its association with the traditional history and culture of the group that ascribes significance to it.

Criteria Considerations

There are six "criteria considerations" that exclude certain properties from eligibility. They include ownership by a religious institution or use for religious purposes; relocated properties; birthplaces and graves; cemeteries; reconstruction; commemoration, and significance achieved within the past 50 years.

"Use for religious purposes" is most pertinent to properties of spiritual and cultural significance to Indian tribes. Bulletin 38 notes,

> In simplest terms, the fact that a property is used for religious purposes by a traditional group, such as seeking supernatural visions, collecting or preparing native medicines, or carrying out ceremonies, or is described by the group in terms that are classified by the outside observer as "religious" should not by itself be taken to make the property ineligible, since these activities may be expressions of traditional cultural beliefs and may be intrinsic to the continuation of traditional cultural practices. Similarly, the fact that the group that owns a property—for example, an American Indian tribe—describes it in religious terms, or constitutes a group of traditional religious practitioners, should not automatically be taken to exclude the property from inclusion in the Register.

Boundary Determination

The preliminary boundary for this property is recommended as the approximate limit of the maple stand in the NW 1/4 of Section 11 of T59N, R14W as shown on aerial photographs and Figure 9. Prior sugaring activity appears to be distributed throughout this area. Additional fieldwork may be conducted to further determine the property boundary.

Recommendation

The Spring Mine Lake Sugarbush is an 80-acre maple stand that was inventoried and evaluated for NRHP eligibility based on the property's cultural and spiritual significance to Lake Superior Ojibwe. Maple sugar is regarded by Ojibwe as a gift from the Creator, as food, and as an offering. Recent oral histories by Ojibwe elders substantiate this significance. Situated near the Vermilion-to-Beaver Bay and New Indian trails mapped by Trygg (1966:17), the sugarbush is documented by Ojibwe families by photographic evidence as early as 1941 (Latady and Isham 2011:4). It is potentially part of a once-extensive system of sugarbush locations in St. Louis County that were harvested during hundreds of years of Ojibwe occupation. The property possesses good historic integrity, notably an integral relationship to traditional cultural practices or beliefs, and retains artifactual evidence of prior use as a sugarbush.

The Spring Mine Lake Sugarbush is recommended as potentially eligible for the NRHP under Criterion A for its association with important Ojibwe spiritual and cultural practices. It is also recommended as

potentially eligible for the NRHP under Criterion C as a distinguishable entity—a maple stand— that represents a larger entity of traditional cultural importance.

Figure 1. Sugarbush site in Section 11, T59 N, R14W showing dominance of sugar maple, 6/10/10. Barr photo.

Figure 2. Log structure ruin (arrow) at Spring Lake Mine Sugarbush, Section 11, T 59N, R 14W, 10/13/10, Barr photo.

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Figure 3. Remains of pine log structure at Spring Mine Lake Sugarbush, 6/9/2010. Corps.

Figure 4. Misshapen bole, Spring Mine Lake Sugarbush, 6/9/2010. Corps.

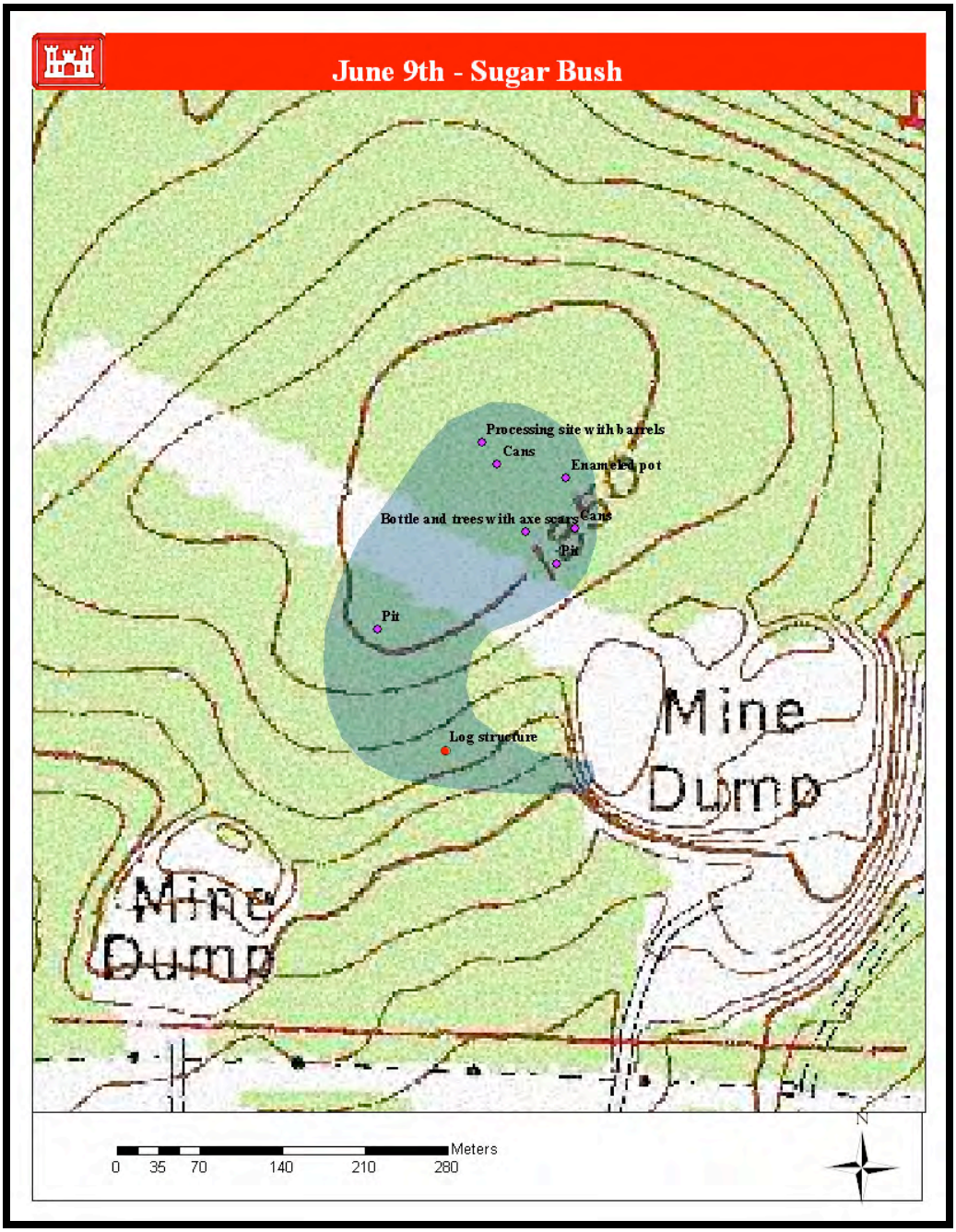

Figure 5. Spring Mine Lake Sugarbush features, 6/9/2010. Corps. Shaded area shows survey area. See Report Figure 17 and Map 21 for detail.

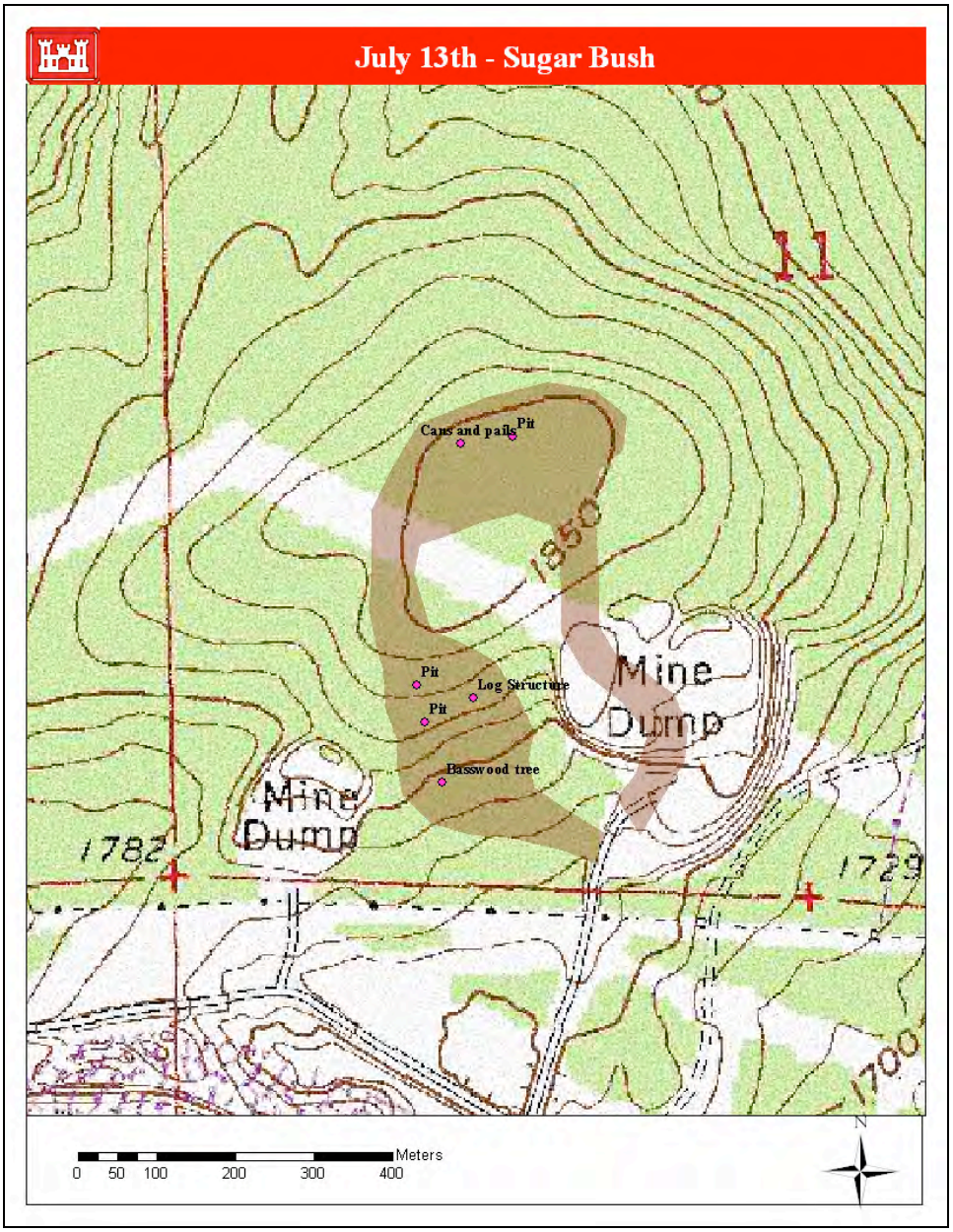

Figure 6. Spring Mine Lake Sugarbush features, 7/13/2010. Corps. Shaded area shows survey area. See Report Figure 17 and Map 21 for detail.

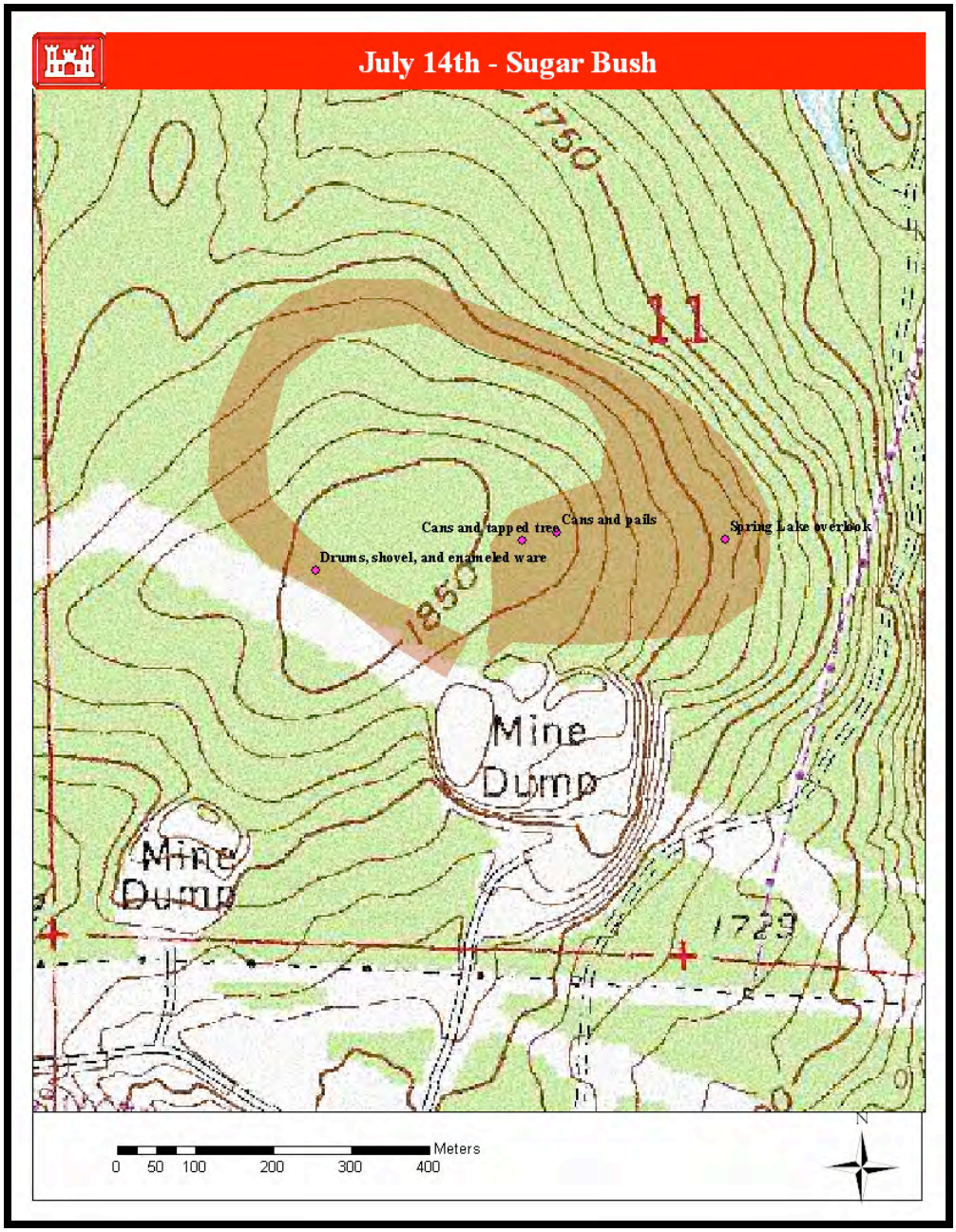

Figure 7. Spring Mine Lake Sugarbush features, 7/14/2010. Corps. Shaded area shows survey area. See Report Figure 17 and Map 21 for detail.

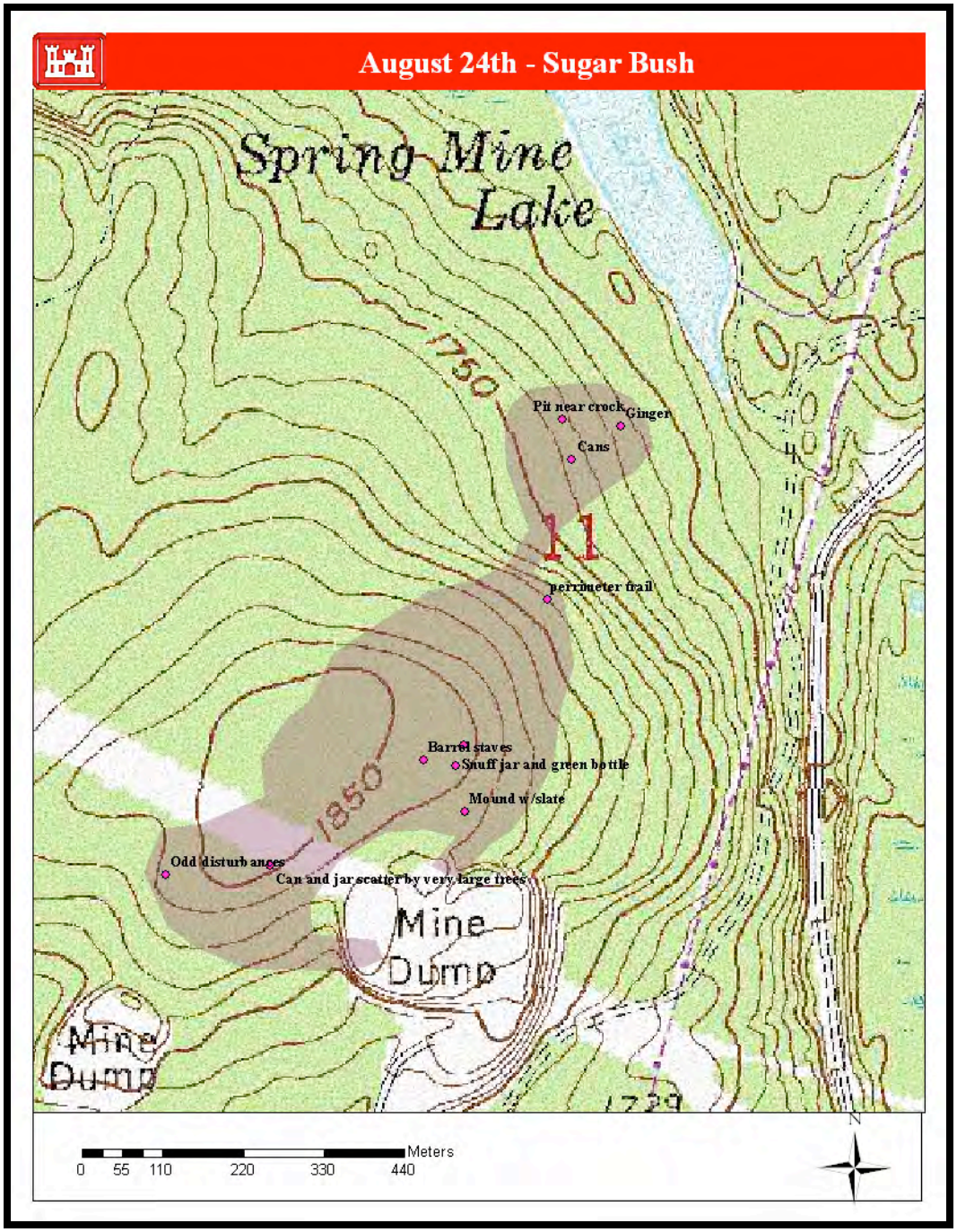

Figure 8. Spring Mine Lake Sugarbush features, 8/24/2010. Corps. Shaded area shows survey area. See Report Figure 17 and Map 21 for detail.

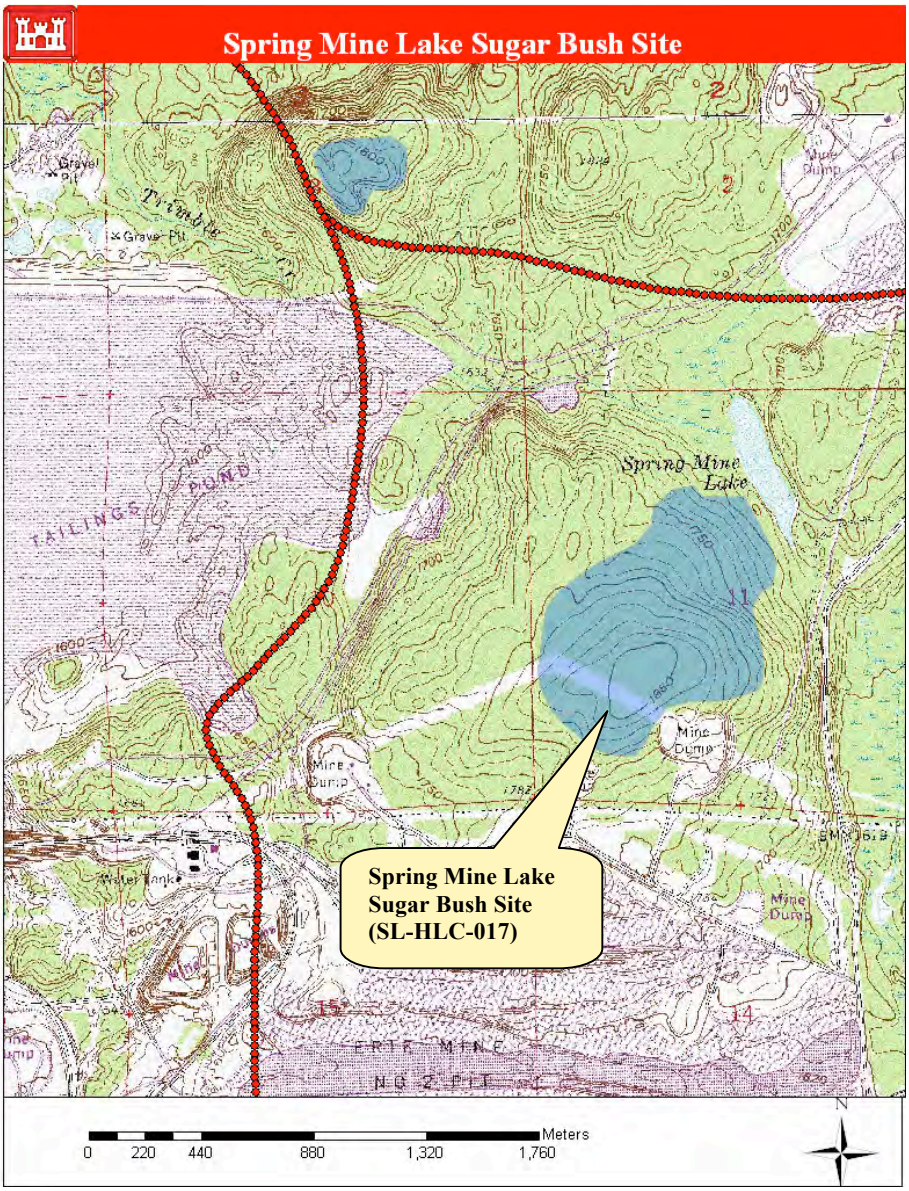

Figure 9. Spring Lake Mine Sugarbush Site Boundary (bottom blue shaded area). Corps. See Report Figure 17 and Map 21 for detail.

6.10.2
Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing

Property Name (1):
Indian Trail Corridor (SL-HLC-019)

Location
Across Sections 1, 2, and 12 of R59N, R13W and Section 35 of T60, R13W
UTM: Z15 578062.7E 5275842N (NW)
UTM: Z15 580487.8E 5273634.7N (SW) NAD 83
Hoyt Lakes, St. Louis County, Minnesota

Property Name (2):
"Lake Vermilion to Beaver Bay" and "New Indian Trail" Intersection (SL-HLC-018)

Location:
Trail intersection in SW1/4 of the NE 1/4 of the NE 1/4 of Section 3 of T59N, R14W
UTM: Z15 567145.8E 5274647.5N NAD 83
Hoyt Lakes, St. Louis County, Minnesota

Date(s) of Survey: various, 6/2010-6/2012

Survey Name: *NorthMet Project Cultural Landscape Study* (Final Report 2012)

Survey by: B. Johnson, Consulting Ojibwe Band Members, other participants (see NorthMet Project Cultural Landscape Study 2012)

Description

Traces of the Lake Vermilion-to-Beaver Bay, New Indian, and other trails that cross T59N, R13W and R14W follow the Laurentian Divide and are etched into some remaining portions of the upland forest landscape. Documented by GLO surveyors during the period 1872–1882, and mapped in the mid-1960s by J. W. Trygg from GLO and other sources, the Trygg Map shows the connections of communication and trade that reached from the Lake Vermilion and Birch Lake area to Lake Superior (Trygg 1966:17; Figure 1). Fieldwork conducted by the Corps, Ojibwe Band members, and other participants for segments of trails outlined by Trygg focused on the areas shown on Figures 4-10. The fieldwork suggested a few defined trail segments (B. Johnson 2012):

A 10,900-foot corridor that appears to contain seasonal trail segments crosses the Partridge River at two points across Sections 1, 2, and 12 of R59N, R13W and Section 35 of T60, R13W (Figure 4; SL-HLC-019).

A segment of the Lake Vermilion-to-Beaver Bay Trail corridor appears to be in the SW1/4 of the NE 1/4 of the NE 1/4 of Section 3 of T59N, R14W, which is the intersection point of the Lake Vermilion-to-Beaver Bay and New Indian trails (Figure 10; SL-HLC-018).

Significance

Although barely discernible to some observers, the Lake Vermilion-to-Beaver Bay, Birch Lake-to-Beaver Bay, "New Indian," and other trails that follow the Laurentian Divide are vivid to Ojibwe Band members. Rose Berens, for example, stated of the Lake Vermilion to Beaver Bay Trail,

> *If there was no mine at PolyMet we would probably not be using the trail like 200 years ago, but I am certain it would be still walked at least once a year from Bois Forte to Grand Portage because it is our connection to relatives in Grand Portage. Because of modern times it would be a spiritual journey, not about transportation. Somebody from Grand Portage would say,"its time we walked that trail—I'll meet you in the middle." It wouldn't be used for travel, but would be walked to keep the trail alive.*
> *We pounded it into the earth and it is to us alive. It contains spirituality and memory of long ago that some of us have. Trails are a deep intricate part of nature and culture. If the mines were not there it would be used in a ceremonial way.*
>
> Rose Berens, Bois Forte Band, 5/1l/11 (Zellie 2011, 6.5.2)

GLO surveyor's field books (1872–1882), township maps, and the Trygg Map (1966:17) show a network of trails used by native people (Figure 1). Although typically not easily discernable and especially when amidst thick brush or in wet, low-lying areas, such trails between Lake Superior and Lake Vermilion were linked to seasonal camps elsewhere across the Lake Superior region. In 1966, with information from GLO surveyor's field books and the survey township maps as well as other sources, J. W. Trygg labeled two prominent trails as the "Indian Trail from Lake Vermilion to Beaver Bay," and the "New Indian Trail." Northwest of the intersection of the trails in sections 33 and 34 of T60N, R14W Trygg noted "remains of an Indian encampment." Another trail shown by Trygg across T60N,R12W linked Birch Lake to Beaver Bay (Figure 1).

Writing in general about this region, 19th-century surveyor and mineral explorer George R. Stuntz noted, "traditions of the Chippewa inform us that they found these trails in their present condition when they drove the Sioux Indians out and took possession of the country" (Stuntz 1885:85).

Trail routes were subject to seasonal variation. Geologists working on surveys for the State of Minnesota explored the area northeast of the project APE, along the Dunka River near Birch Lake. Alexander Winchell described his 1886 visit to the "Indian winter trail" crossing Sections 10 and 15 of T60N, R12W:

> The river can be ascended by a canoe about half a mile, although there is a copious delta accumulation at the mouth, consisting of sand, which extends far into the lake, producing so shallow water that a small bark canoe drags on the bottom when carrying two men. The Indian winter trail, which leads to Beaver Bay on Lake Superior, leaves the right bank of the river near the town-line between 61-12 and 60-12, and it can easily be followed as far as we went, and probably all the way to Lake Superior. It is obstructed by numerous old pines and poplars thrown down by the wind. It crosses the river in S. W. 1/4 sec.10, 60-12, and again in sec. 15, next south, and then bears more easterly. The country through which it passes is chiefly drift covered, and holds considerable good pine, though chiefly Norway averaging 16 to 20 inches in diameter. Ten years' growth will make it very valuable. (Winchell 1887:341).

Archaeologists have observed that linear travel portions of trails generally do not have many cultural materials directly associated with them. Cultural materials are more likely to be lost or discarded where

trails meet or where they end or begin at other features, such as bodies of water (Thompson et al. 1996). Trails shown on the Trygg Map and the trail points noted by surveyors generally followed the highest and driest overland routes. Within T59N, R13W and R14W the identified trails appear to represent the shortest-distance routes between Lake Vermilion and Lake Superior. Subsidiary trails would have potentially linked to hunting and fishing points, features such as promontories, and special plant communities (Figure 1).

NRHP Evaluation

The following discussion of integrity, NRHP criteria and criteria considerations are a preface to the evaluation of the Indian trails discussed in 4.4.

Integrity

NRHP Bulletin 38 notes that following determination that a natural feature possesses enough association with significant tradition or use, integrity must be considered (Parker and King rev. 1998).

In order to be eligible for inclusion in the Register, a property must have "integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR Part 60). For properties of spiritual and cultural significance to Indian tribes, two questions about integrity are important. The first asks, "does the property have an integral relationship to traditional cultural practices or beliefs?"

Bulletin 38 states,

> If the property is known or likely to be regarded by a traditional cultural group as important in the retention or transmittal of a belief, or to the performance of a practice, the property can be taken to have an integral relationship with the belief or practice, and vice-versa (Parker and King rev. 1998).

The second question asks, "is the condition of the property such that the relevant relationships survive?" A property that once had traditional cultural significance can lose such significance through physical alteration of its location, setting, design, or materials, or through alteration of setting and environment.

Bulletin 38 notes,

> The integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation (Parker and King rev. 1998).

If the property has lost integrity for its spiritual and cultural associations, it may still retain archeological deposits significance for their information content.

Application of NRHP Criteria

The NRHP Criteria can be applied to properties that retain adequate integrity. The property must meet at least one of four criteria:

Criterion A. Association with events that have made a significant contribution to the broad patterns of our history.

Bulletin 38 notes that the actual time a traditional event took place may be ambiguous; in such cases it may be impossible, and to some extent irrelevant, to demonstrate with certainty that the property in

question existed at the time the traditional event occurred. As long as the tradition itself is rooted in the history of the group, and associates the property with traditional events, the association can be accepted.

Criterion B. That are associated with the lives of persons significant in our past.

Bulletin 38 notes that this criterion should be interpreted with reference to the people who are thought to regard the property as traditionally important. The word "persons" can be taken to refer both to persons whose tangible, human existence in the past can be inferred on the basis of historical, ethnographic, or other research, and to "persons" such as gods and demigods who feature in the traditions of a group.

Criterion C. Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

Bulletin 38 notes that since this applied to properties that have been constructed, in general it is not applicable to natural features. One exception would include features such as pictoglyphs or pictographs (high artistic values). Another would include groupings of special plants; as individual objects they lack distinction, but the larger entity of which they are a part may be of prime importance in the area's history (Parker and King rev. 1998).

Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

Bulletin 38 notes that a property's history of yielding, or potential to yield, information—if relevant to its significance at all—is secondary to its association with the traditional history and culture of the group that ascribes significance to it.

Criteria Considerations

There are six "criteria considerations" that exclude certain properties from eligibility. They include ownership by a religious institution or use for religious purposes; relocated properties; birthplaces and graves; cemeteries; reconstruction; commemoration, and significance achieved within the past 50 years.

"Use for religious purposes" is most pertinent to properties of spiritual and cultural significance to Indian tribes. Bulletin 38 notes,

> In simplest terms, the fact that a property is used for religious purposes by a traditional group, such as seeking supernatural visions, collecting or preparing native medicines, or carrying out ceremonies, or is described by the group in terms that are classified by the outside observer as "religious" should not by itself be taken to make the property ineligible, since these activities may be expressions of traditional cultural beliefs and may be intrinsic to the continuation of traditional cultural practices. Similarly, the fact that the group that owns a property—for example, an American Indian tribe—describes it in religious terms, or constitutes a group of traditional religious practitioners, should not automatically be taken to exclude the property from inclusion in the Register.

Boundary Determination

Preliminary boundaries for the trail corridor across Sections 1, 2, and 12 of R59N, R13W and Section 35 of T60, R13W (Figure 4) and the intersection of two trails in Section 3 of T59N, R14W (Figure 10) are shown. Additional fieldwork may further confirm corridor boundaries.

Recommendation

A 10,900-foot trail corridor and a trail intersection point that appear to contain segments of the Lake Vermilion-to-Beaver Bay Trail were evaluated for NRHP eligibility based on their cultural and spiritual significance to the Ojibwe. Although interrupted by Euro-American agriculture, logging, mining, and road and townsite development, the trails remain an important cultural and spiritual connection. Recent oral histories by Ojibwe elders substantiate this significance. The trail corridor and intersection are potentially part of a once-extensive system of overland trails that were in use during hundreds of years of Ojibwe occupation. The segments and point that have received preliminary identification possess historic integrity, notably an integral relationship to traditional cultural practices or beliefs.

The trail corridor and trail intersection are recommended as potentially eligible for the NRHP under Criterion A for their association with important Ojibwe spiritual and cultural practices. They are also recommended as potentially eligible for the NRHP under Criterion C as distinguishable entities that represent a larger entity of traditional cultural importance, namely an extensive trail system that linked Ojibwe settlements near Lake Vermilion with those on Beaver Bay on Lake Superior and to points beyond including Grand Portage.

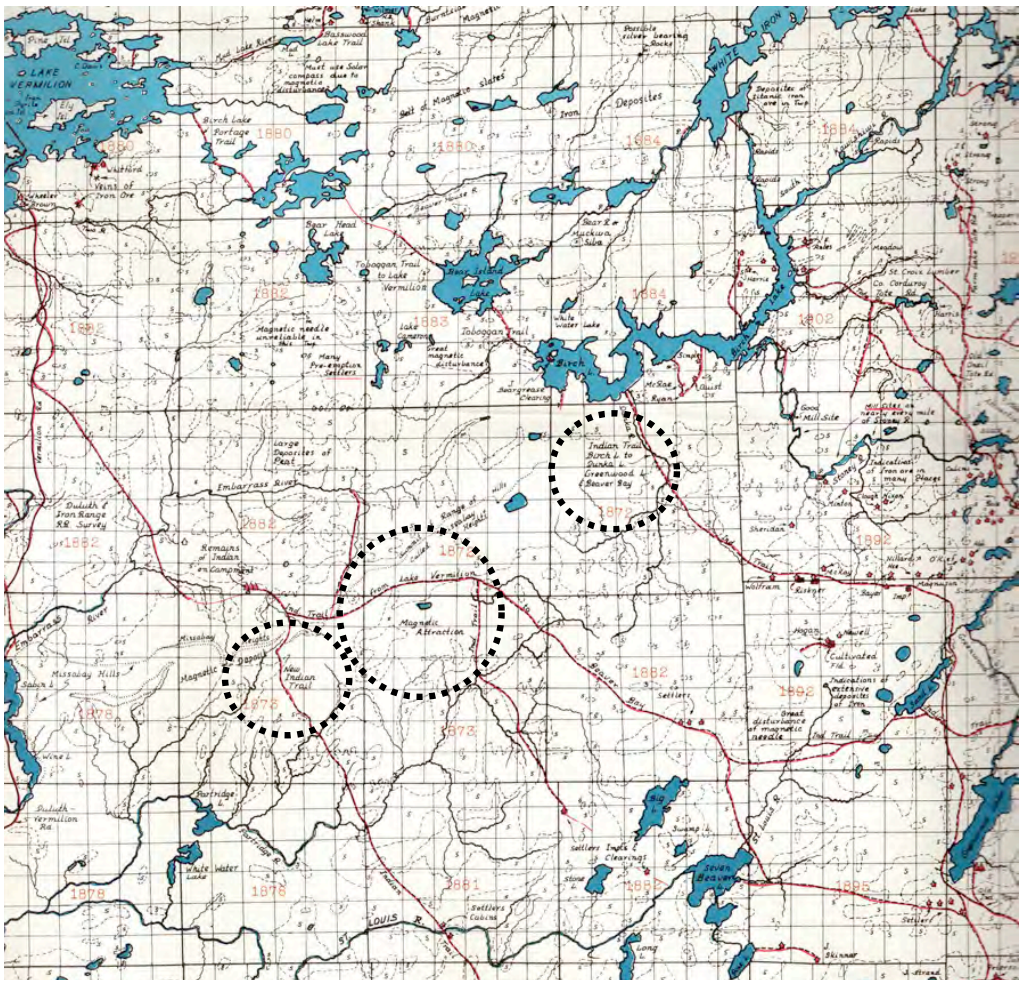

Figure 1. J. W. Trygg, *Composite Map of United States Land Surveyors' Original Plats and Field Notes* (1966), Sheet 17. Example of the Trygg compilation of GLO data and additional information. Trail labels circled. J. W. Trygg, used with permission.

Figure 2. Looking northwest from the starting point on 7/9/2010, showing brushed-out corridor that followed the approximate alignment of the Lake Vermilion to Beaver Bay Trail. Corps photo.

Figure 3. Looking north across the northern part of the logged clearing, Section 1 of T59N, R13W, 8/25/2010. Corps photo.

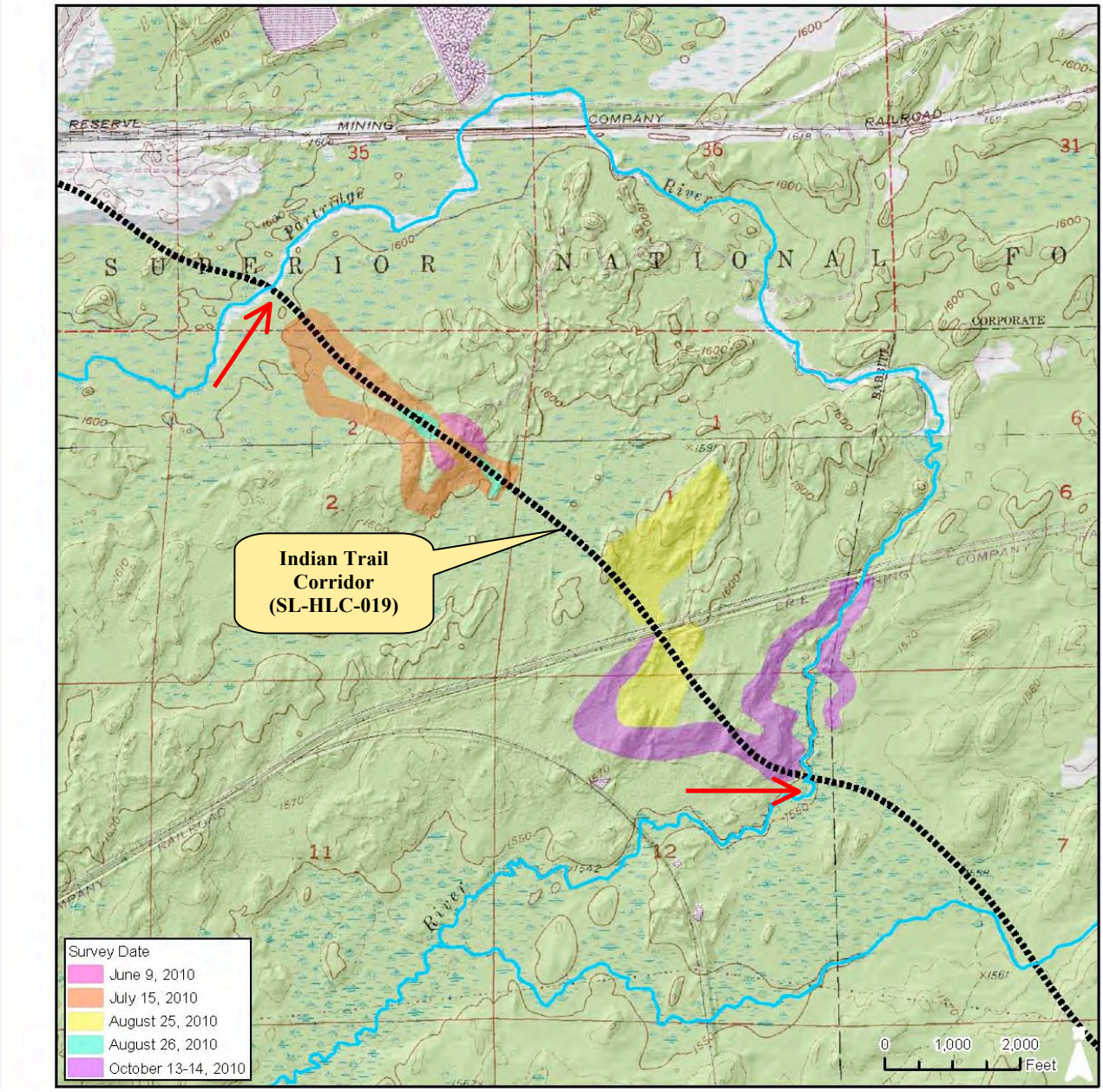

Figure 4. Indian Trail Corridor boundaries shown at arrows. Corps.

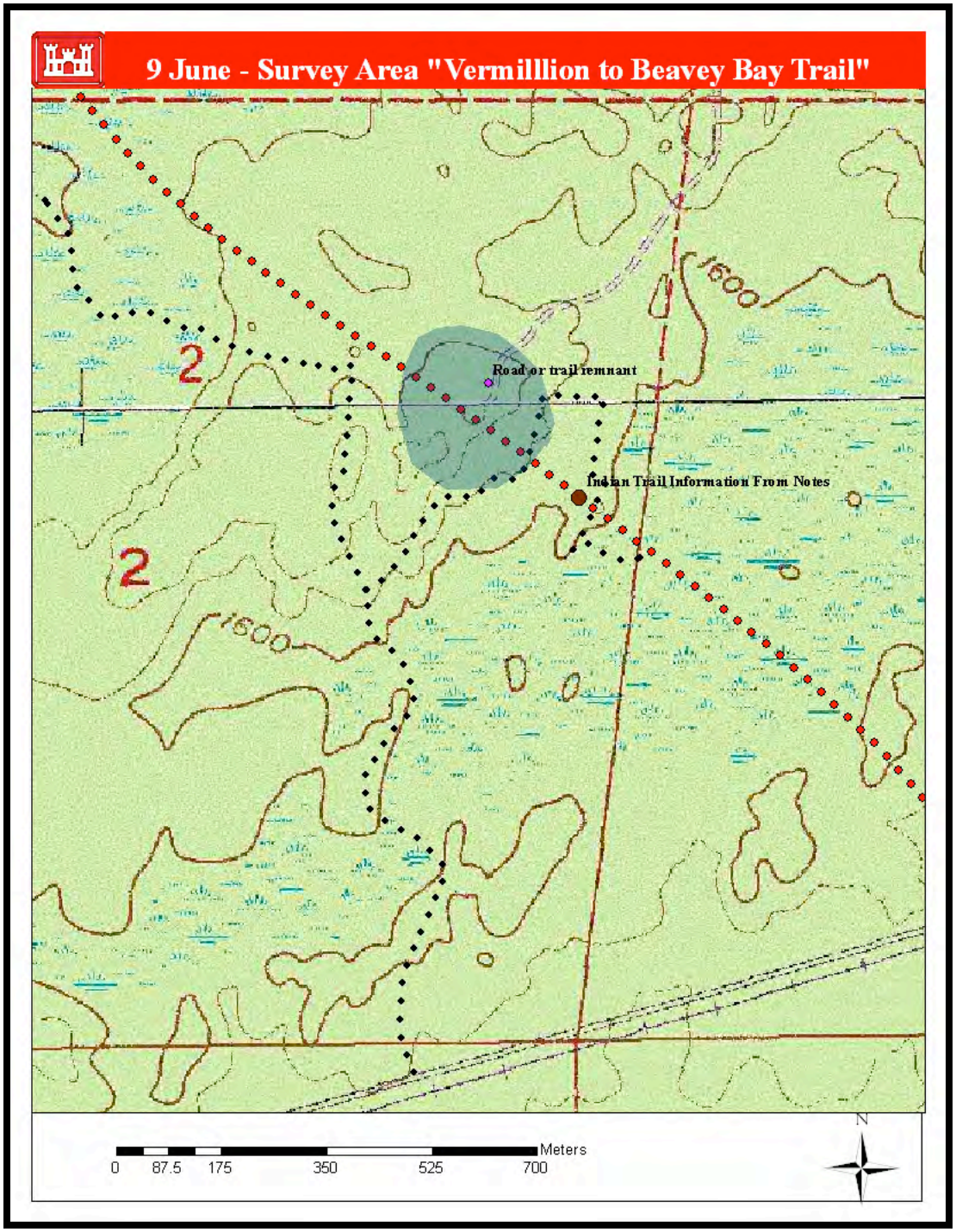

Figure 5. Lake Vermilion to Beaver Bay Trail, 6/9/2010. Corps. Shaded area shows survey area. See Report Figure 27 and Report Map 21 for detail.

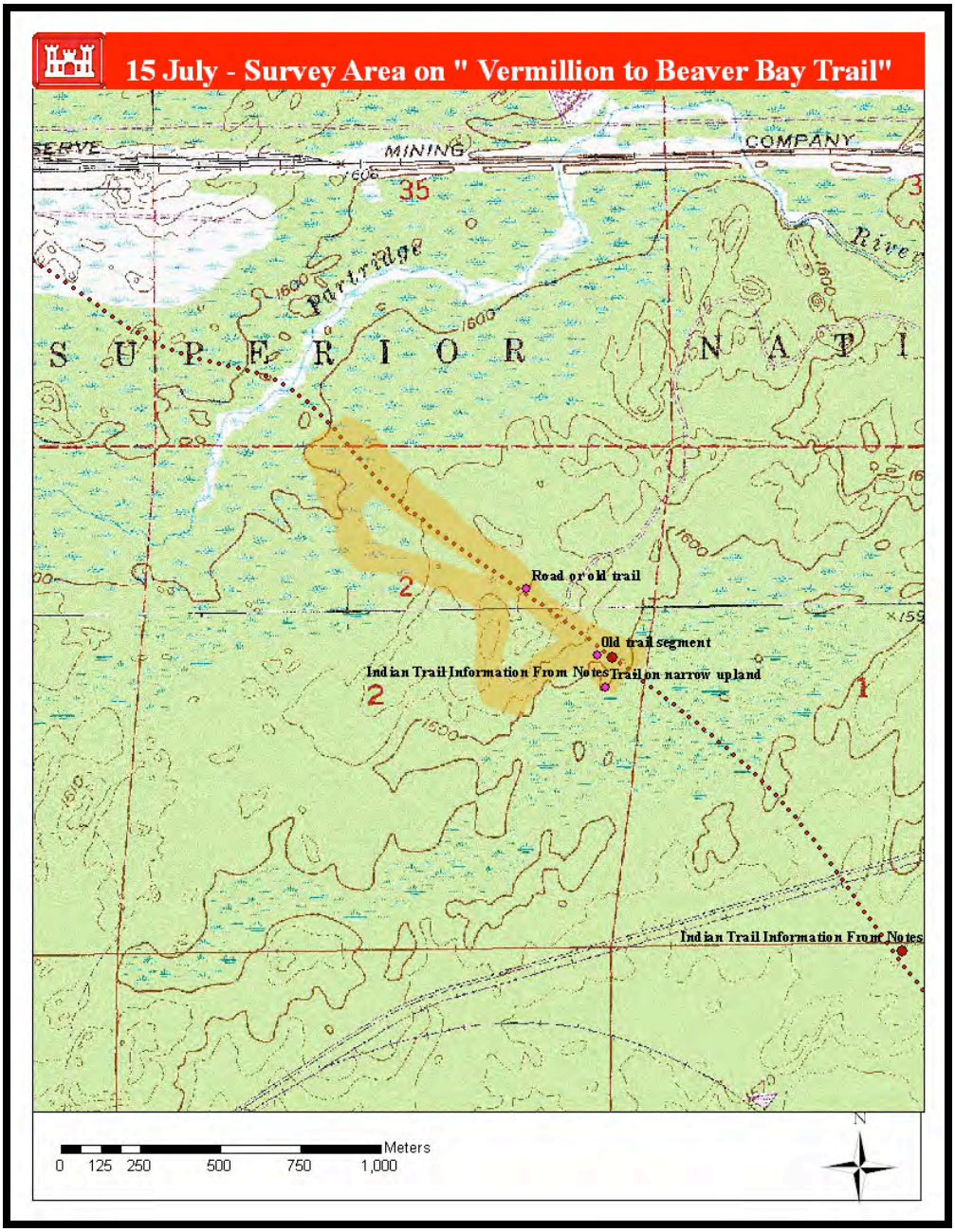

Figure 6. Lake Vermilion to Beaver Bay Trail, 6/15/2010. Corps. Shaded area shows survey area. See Report Figure 27 and Report Map 21 for detail.

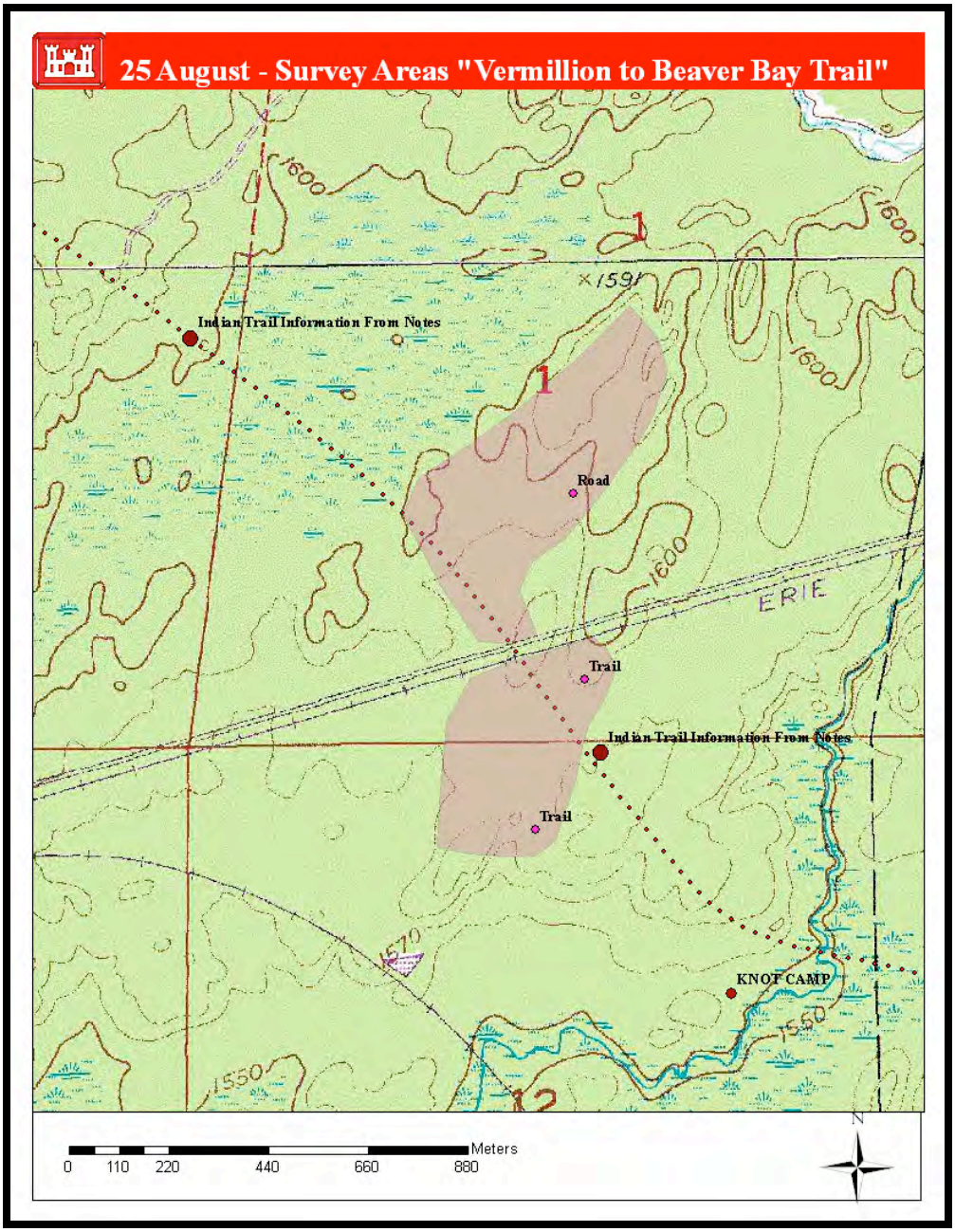

Figure 7. Lake Vermilion to Beaver Bay Trail, 8/25/2010. Corps. Shaded area shows survey area. See Report Figure 27 and Report Map 21 for detail.

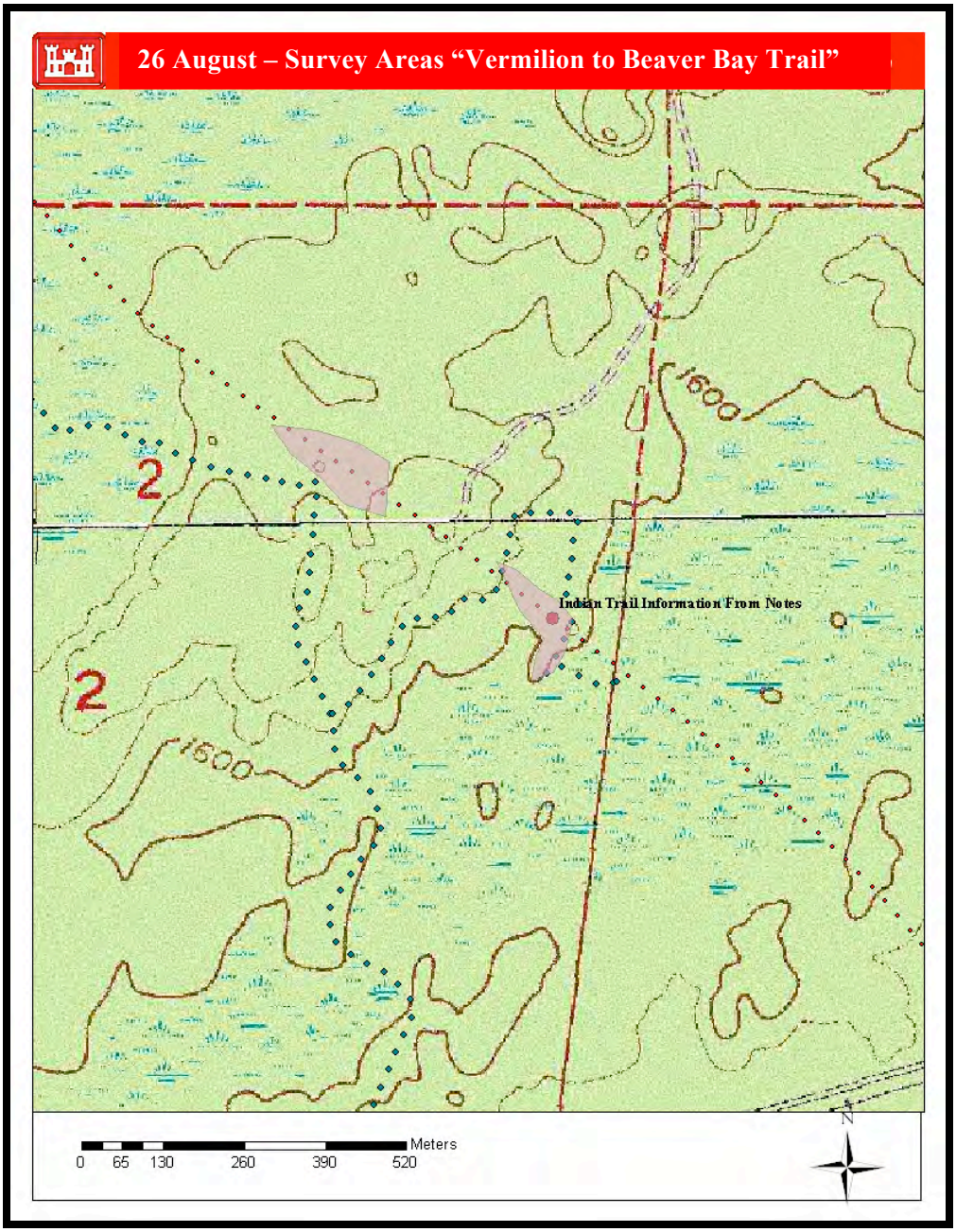

Figure 8. Lake Vermilion to Beaver Bay Trail, 8/26//2010. Corps. Shaded area shows survey area. See Report Figure 27 and Report Map 21 for detail.

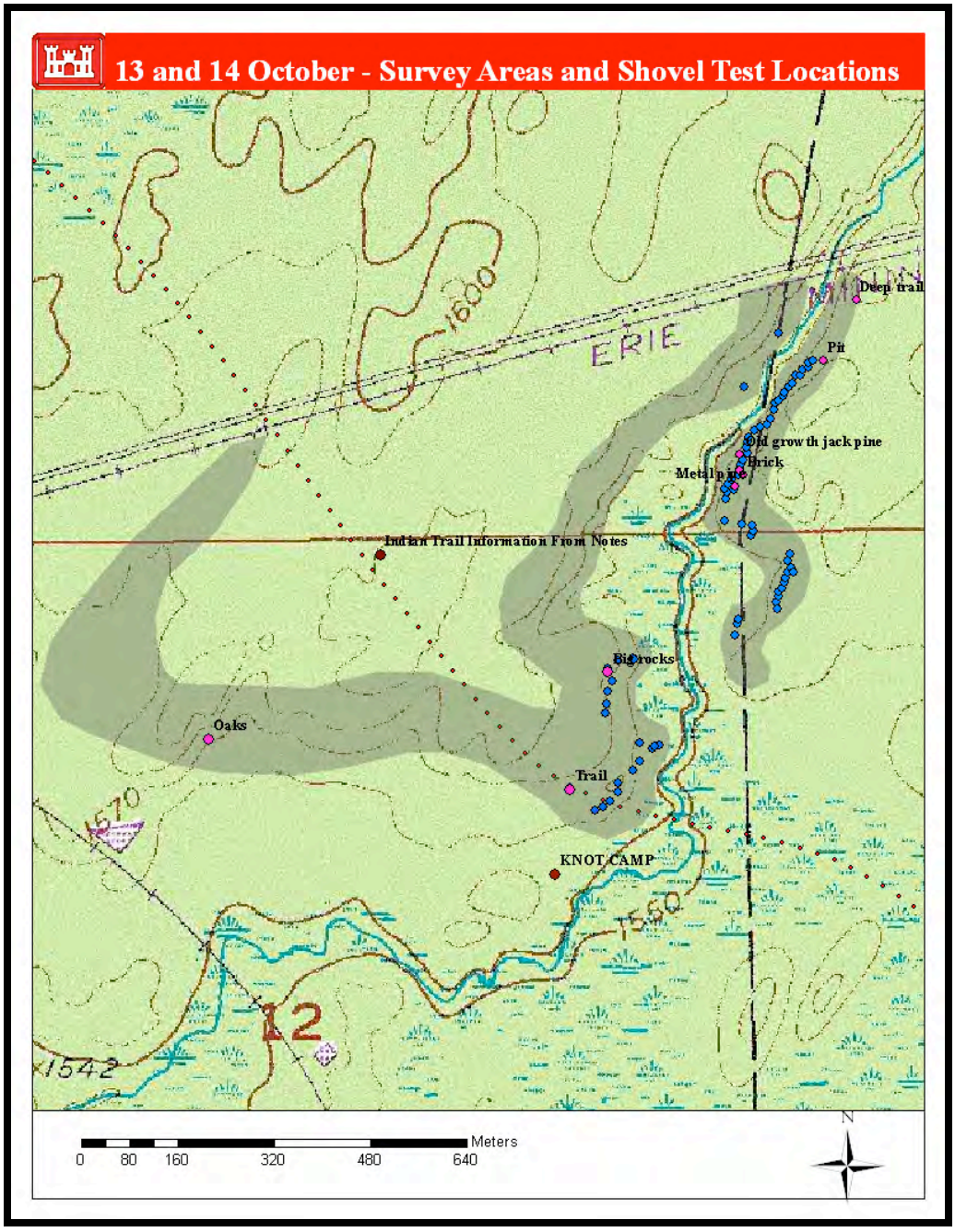

Figure 9. Lake Vermilion to Beaver Bay Trail, 10/13-14/2010. Corps. Shaded area shows survey area. See Report Figure 27 and Report Map 21 for detail.

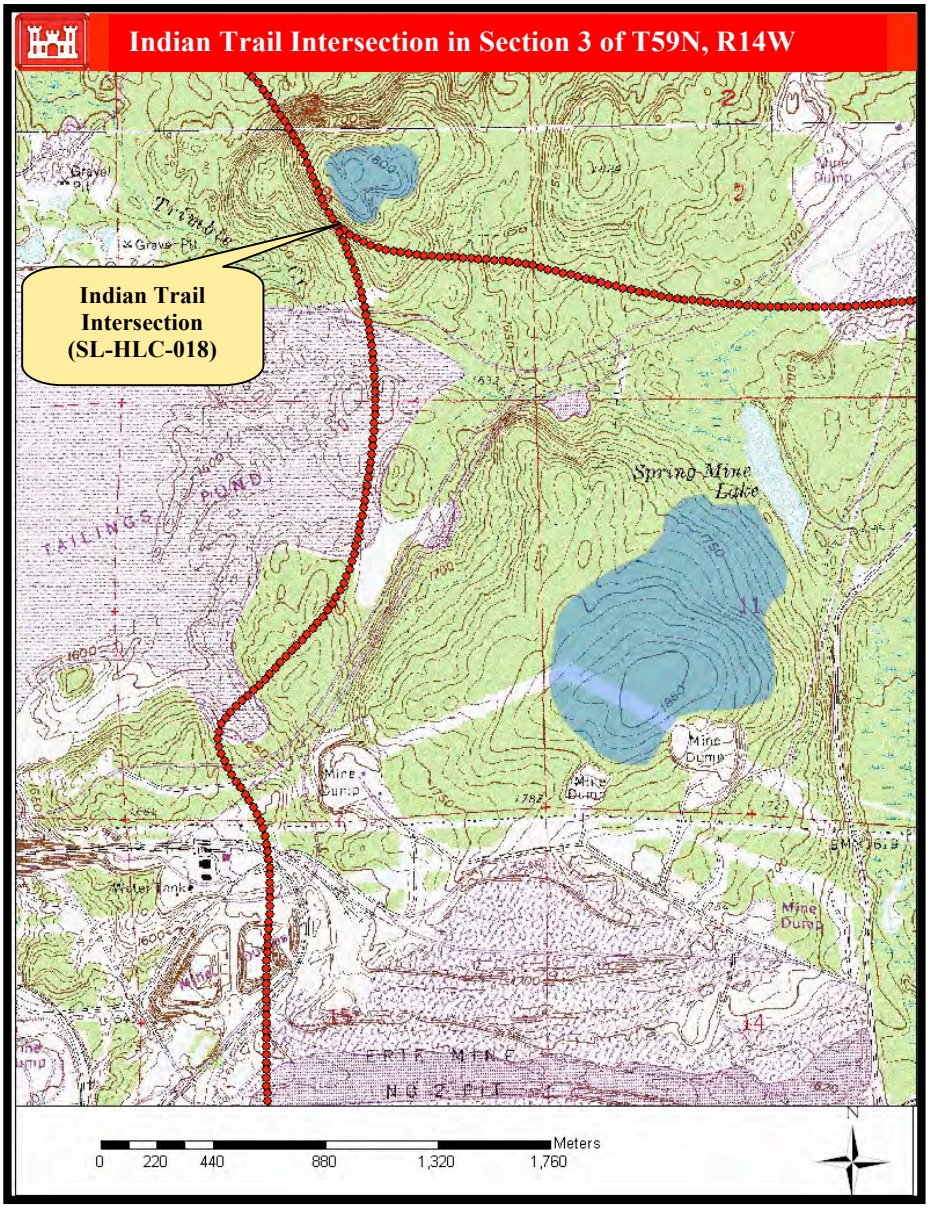

Figure 10. Indian Trail Intersection in Section 3 of T59N, R14W. Corps. See also Report Map 21.

6.10.3
Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: *Missabe Widjiw* Area NRHP Multiple Property Listing

Property Name (1)
Overlook (SL-HLC-016)
UTM: Z15 527826E 5274957N (centroid) NAD 83

Location
NW 1/4, NE 1/4 of Section 3 T59N, R14W
Hoyt Lakes, St. Louis County, Minnesota

Property Name (2)
***Missabe Widjiw* Viewshed at Overlook (SL-HLC-015)**
UTM: Z15 567287E 5274445N (W approximate boundary)
Z15 567826E 5274957N (E approximate boundary)

Location
Hoyt Lakes, St. Louis County, Minnesota

Date(s) of Survey: various, 6/2010-6/2012

Survey Name: *NorthMet Project Cultural Landscape Study* (Final Report 2012)

Survey by: B. Johnson, Consulting Ojibwe Band Members, other participants (see NorthMet Project Cultural Landscape Study 2012)

Description

Overlook

A granite-capped promontory and overlook in the NW 1/4 of the NE 1/4 of Section 3 of T59N, R14W comprise prominent topographic features situated on the south slope of the Giant's Range of the Laurentian Divide (*Missabe Widjiw*). Granitic hills rise about 500 feet above the surrounding landscape and the overlook north of the intersection of two Indian trails. Specific points of these trails were identified by General Land Office (GLO) surveyors in 1872, and the routes were delineated by Trygg in 1966 (1966:17; Figures 1, 3-8).

This feature along the east edge of the LTV tailings basin is dominated by regenerating birch and aspen on the lower slopes. However, the mid- to upper slopes are more diverse, with occasional mature remnant red and white pines, small maple stands, and occasional red and pin oak stands. GPS locations of the remnant pines, maple and oak stands appear to correlate to the trail shown on the Trygg Map.

The promonotory and granite outcrop (approximately 40 by 25 feet in size) are located near the point where the Trygg Map (1966:17) indicates an intersection of trails. The sequence of rock outcrops encountered along the trail shown by Trygg provides a series of west- and south-facing perspectives around to the south slope of the overlook. Continuing up to the top of the feature, a broad bare rock area provides and overlook with views to the east. There is a small spring on the south slope of the elevation leading to the summit (Figure 6).

Vegetation on the upper slopes and top of the overlook is primarily similar to the fire-dependent

vegetation communities found throughout the study area, with a few notable exceptions:

- There are at least two small stands of red and/or pin oak (*Quercus rubra, Q, ellipsoidalis*) near the top and along the trail delineated by the series of rock outcrops. These are the only two plots where oak of any species was identified during the 2010 survey (Figure 5).
- Moreover, past vegetation surveys on the NorthMet site have never documented oak individuals or stands anywhere on the site.
- Small groups and individuals of sugar maple were also seen during the side traverse of the overlook. Again, sugar maple is an uncommon species on the NorthMet site. The sugar maple plots documented at the sugarbush site are the only extensive sugar maple areas that Barr biological staff is aware of at NorthMet.
- There are occasional scattered large remnant white pines near the top of the overlook and along the upper slopes. White pine is uncommon at the NorthMet site in modern times, and the white pine that is present is generally not as mature as the pines found on the overlook (Figure 3).

These exceptional occurrences of sugar maple and oak may be natural, or they may be the result of Native American utilization of the overlook and the trails passing across its upper slopes. As noted by Bois Forte elder Rose Berens, the overlook would be an important waypoint to stop and spend time. There is no irrefutable evidence that the oak and maple are the progeny of trees intentionally planted by travelers along the overlook trails. However, the apparent absence of these species in most of the rest of the study area, along with the potential for traditional use, offer compelling circumstantial evidence that the oak and maple on the overlook are the legacy of past Native American use.

The large remnant pines may be matured trees that were too young and/or too difficult to access by logging. No age data was collected. Obtaining cores from several of these trees would help explain why they are present on the overlook.

***Missabe Widjiw* (Laurentian Divide)**

The geologist's term "Giant's Range" refers to the great body of granite that lies between the Mesabi and Vermilion iron-mining districts, and which is locally referred to as the Embarrass Mountains. The Range is part of the Laurentian Divide, which separates the watershed of streams that flow north to the Arctic Ocean from the watershed of streams that flow south through the Great Lakes to the Atlantic Ocean (Ojakangas and Matsch 1982:184). The bedrock is made up of metamorphosed Archean (2.8 – 2.5 billion years old) volcanic and sedimentary rocks typical of the millions of square miles of glaciated Precambrian shield exposed in Canada. These rocks are intruded by granitic intrusive bodies, of which the Giant's Range granite exposed at the overlook is one example.

South of the Giant's Range, much younger rocks (Paleoproterozoic – 2.5-1.8 billion years old) were deposited on the Archean rocks. Much of the present landscape owes its character to the very recent erosion of bedrock by glaciers. Erosion by glaciers took advantage of and scoured along faults, bedding planes, and other weaknesses in the bedrock, leaving harder and more resistant rock behind. Bedrock that had been deeply weathered during a late Cretaceous to possibly Tertiary (65-100 million years ago) weathering episode would have been easily eroded during the many glacial advances (Lehr and Hobbs 1992) of the Pleistocene, leaving behind relatively resistant bedrock outcrops. The Giant's Range is elevated above surrounding topography possibly because it was protected from the earlier weathering episode by a cap of iron-rich rock, which has subsequently eroded (Lehr and Hobbs 1992).

Glacially scoured bedrock outcrops are common in the area and are located on either side of exposed granitic hills of the Giant's Range, which rise to 500 feet above the surrounding landscape. The outcrop

of Giant's Range granite and other late Archean metasedimentary rocks makes up the high hills located directly to the east and southwest of the LTV tailings basin (Figure 7).

History

Explorers' and geologists' late 19th- and early 20th-century maps do not label this outcrop; most of their attention was on the prominent Giant's Range of the Laurentian Divide that rises in this area as the Embarrass Mountains. The Divide has an elevation of approximately 1,850 feet within the viewshed of this overlook and other nearby features. In 1843 Joseph N. Nicollet mapped the highland range as Missabay Heights; in 1848 Joseph G. Norwood called it *Missabe Wachu,* or Big Man Hills. In 1886 Joseph Gilfillan noted the Ojibway names as "missabe wudjiu or "Giant Mountain" (Upham 1969:504). The rise of land was noted even by early Minnesota Territory guidebook writers:

> A mountain extends all the way between the St. Louis River and Pigeon River. It evidently abounds in copper, iron and silver. The terrestrial compass can not be used there, so strong is the attraction to the earth. The needle rears and plunges "like mad."
>
> J. Wesley Bond, *Minnesota and its Resources* (1853)

Significance

> *Mesabi means giant. [There is a story] that a giant appeared [in some location on/near] the Laurentian Divide. We leave tobacco at a location along the Laurentian Divide [which is considered sacred, a rocky outcrop].*
>
> Ron "Mootz" Geshick, Bois Forte Band Elder, June 18, 2011 (Walker and Zellie 2011, 6.5.3)

The spiritual power of *Missabe Widjiw* is consistently reported by Bois Forte Band elders. It is the route to Thunder Bay and Thunder Mountain in Canada. Some elders noted its association with physical and metaphysical journeys and has a corporeal and spiritual beginning and ending. Offerings occurring along the way represent a substantive acknowledgement of the trails' spiritual power (Latady and Isham 2011:4). Bois Forte elder Jim Gawboy noted that the Divide has a spiritual path that the Thunderbird uses and only those who really want to see the Thunderbird regard it as a sacred place, and a place to leave offerings, and tobacco (Latady and Isham 2011:3). Becky Gawboy stated that she learned about the Thunderbird from elders from Grand Portage and Nett Lake. The story was that "the Spiritual Power of all of us here [Ojibwe] comes through the Thunderbird." She noted "This is an important and powerful trail that has to be guarded and protected, because there are many gifts that Indian people, indeed all people, still need" (Latady and Isham 2011:4).

The overlook is part of the *Missabe Widjiw* that forms the backdrop for the area's Native American cultural landscape. Bois Forte Band Elder, Rose Berens, visited the overlook site on June 10, 2010. She later described this and other similar features as "someplace to make us stop and spend some time" (Zellie 2011, 6.5.2). She noted that rock outcrops are "high power" areas, especially east-facing. This east-facing outcrop is not common and this type of area "could not go unnoticed; it would be used for spiritual purposes. It would be a spot to go for special occasions or ceremonies." Such a spot, so near trails, would have been used. She noted,

> *Visiting such a spot I would find a little protruding rock and leave some tobacco; instantly I would imagine people sitting there, using it for a vision quest. Fathers might take their sons to such a place to fast."*
>
> Rose Berens, Bois Forte Band Elder, May 11, 2011 (Zellie 2011)

The overlook is representative of sites important to Ojibwe for possessing spiritual power. The site also contains a collection of oaks and plants important to Ojibwe. The presence of the oak trees at the

overlook, and the approximate location of the nearby trail junction suggests that this is a culturally significant area. Rose Berens explained the importance of oak in Ojibwe tradition as well as the significance of the east-facing overlook. Places where oak trees grow are considered to be places where people camped or traveled. Acorns were at times carried on journeys and planted at such locations. This traditional practice is known through Ojibwe oral history. Rock outcrops with an eastern view of the rising sun, such as the one on this summit, are places sought by Ojibwe for spiritual purposes, and the *Missabe Widjiw* is also a place of known significance in traditional practice and oral history.

NRHP Evaluation

Integrity

NRHP Bulletin 38 notes following determination that a natural feature possesses enough association with significant tradition or use, integrity must be considered (Parker and King rev. 1998).

NRHP Bulletin 38 notes that order to be eligible for inclusion in the Register, a property must have "integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR Part 60). For properties of spiritual and cultural significance to Indian tribes, two questions about integrity are important. The first asks, “does the property have an integral relationship to traditional cultural practices or beliefs?”

Bulletin 38 states,

> If the property is known or likely to be regarded by a traditional cultural group as important in the retention or transmittal of a belief, or to the performance of a practice, the property can be taken to have an integral relationship with the belief or practice, and vice-versa (Parker and King rev. 1998).

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A property that once had traditional cultural significance can lose such significance through physical alteration of its location, setting, design, or materials, or through alteration of setting and environment.

Bulletin 38 notes,

> The integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation (Parker and King rev. 1998).

If the property has lost integrity for its spiritual and cultural associations, it may still retain archeological deposits significance for their information content.

Application of NRHP Criteria

The NRHP Criteria can be applied to properties that retain adequate integrity. The property must meet one of four criteria (Section 1.3.3).

Criterion A. Association with events that have made a significant contribution to the broad patterns of our history.

Bulletin 38 notes that the actual time a traditional event took place may be ambiguous; in such cases it may be impossible, and to some extent irrelevant, to demonstrate with certainty that the property in

question existed at the time the traditional event occurred. As long as the tradition itself is rooted in the history of the group, and associates the property with traditional events, the association can be accepted.

Criterion B. That are associated with the lives of persons significant in our past.

Bulletin 38 notes that this criterion should be interpreted with reference to the people who are thought to regard the property as traditionally important. The word "persons" can be taken to refer both to persons whose tangible, human existence in the past can be inferred on the basis of historical, ethnographic, or other research, and to "persons" such as gods and demigods who feature in the traditions of a group.

Criterion C. Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

Bulletin 38 notes that since this applied to properties that have been constructed, in general it is not applicable to natural features. One exception would include features such as pictoglyphs or pictographs (high artistic values). Another would include groupings of special plants; as individual objects they lack distinction, but the larger entity of which they are a part may be of prime importance in the area's history (Parker and King rev. 1998).

Criterion D. That have yielded, or may be likely to yield, information important in prehistory or history.

Bulletin 38 notes that a property's history of yielding, or potential to yield, information—if relevant to its significance at all—is secondary to its association with the traditional history and culture of the group that ascribes significance to it.

Criteria Considerations

There are six "criteria considerations" that exclude certain properties from eligibility. They include ownership by a religious institution or use for religious purposes; relocated properties; birthplaces and graves; cemeteries; reconstruction; commemoration, and significance achieved within the past 50 years.

"Use for religious purposes" is most pertinent to properties of spiritual and cultural significance to Indian tribes. Bulletin 38 notes,

> In simplest terms, the fact that a property is used for religious purposes by a traditional group, such as seeking supernatural visions, collecting or preparing native medicines, or carrying out ceremonies, or is described by the group in terms that are classified by the outside observer as "religious" should not by itself be taken to make the property ineligible, since these activities may be expressions of traditional cultural beliefs and may be intrinsic to the continuation of traditional cultural practices. Similarly, the fact that the group that owns a property—for example, an American Indian tribe—describes it in religious terms, or constitutes a group of traditional religious practitioners, should not automatically be taken to exclude the property from inclusion in the Register.

Boundary Description

The recommended preliminary boundary for the overlook property in the NW 1/4, NE 1/4 of Section 3 T59N, R14W is defined by the outline shown on Figure 8. Further fieldwork may be required to confirm elevation contours.

Bulletin 38 notes that "the traditional uses to which the property is put must be carefully considered . . . . where the property is used for contemplative purposes, viewsheds are important and must be considered in boundary definition." The portion of the *Missabe Widjiw* that forms the viewshed from the overlook and its vicinity is recommended as the boundary associated with the evaluation for the overlook. The approximate highest elevation of the viewshed is shown as a straight line on Figure 7. Further fieldwork may be required to confirm viewshed boundaries.

Recommendation

The overlook in the NW 1/4, NE 1/4 of Section 3 of T59N, R14W is a component of the *Missabe Widjiw* (Laurentian Divide) that Ojibwe regard as spiritually and culturally important. Such promonotories are regarded as "high power" areas, especially east-facing. The *Missabe Widjiw* is described by tribal elders as a sacred place. The overlook feature and *Missabe Widjiw* viewshed were evaluated for NRHP eligibility based on the property's cultural and spiritual significance to Lake Superior Ojibwe. Despite distant views of mining features to the east that includes the skyline of the Erie Mining Company plant, the overlook and the surrounding viewshed possess good historic integrity, notably an integral relationship to traditional cultural practices or beliefs. They are recommended as potentially eligible for the NRHP under Criterion A for their association with important Ojibwe spiritual and cultural practices. The overlook and viewshed are also recommended as potentially eligible for the NRHP under Criterion C as components of a distinguishable entity—*Missabe Widjiw*—that represent a larger entity of traditional cultural importance.

Figure 1. Looking east at the overlook (center) in Section 3, T59N, R14W, 9/9/2010. Barr photo.

Figure 2. The Giant's Range: looking west/northwest along the Embarrass Mountains, west of the overlook in Section 3 of T59N, R14W, 10/13/2010. Barr photo.

Figure 3. Looking north at the overlook and granite outcrop in Section 3 of T59N, R14W, 10/13/2010. Barr photo.

Figure 4. Outcrop at overlook in Section 3 of T59N, R14W, looking north, 6/9/2010. Barr photo.

Figure 5. Viewshed from overlook in Section 3 of T59N, R14W, looking east, 6/9/2010. Red or pin oak in center foreground. Landscape Research LLC photo.

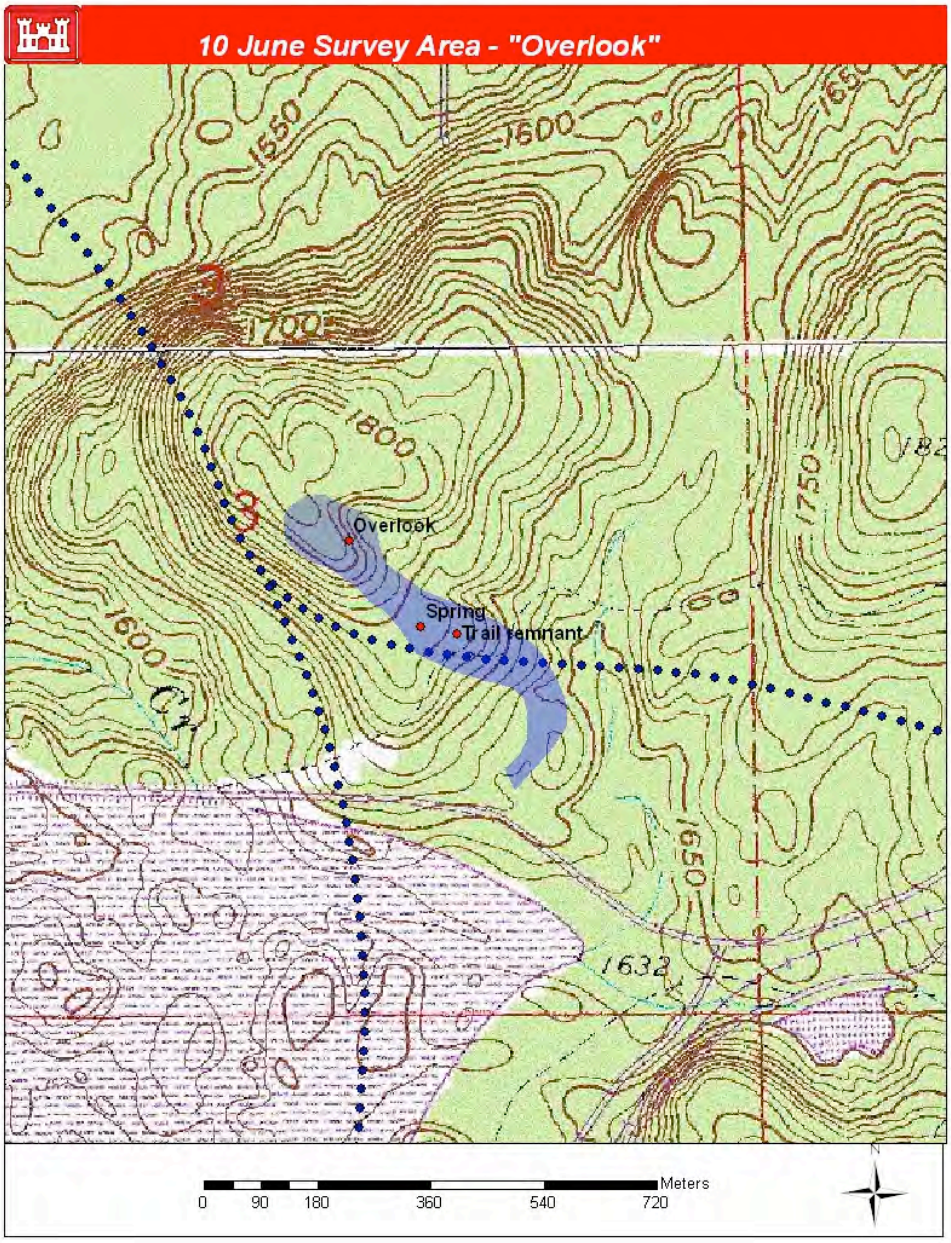

Figure 6. Overlook in Section 3 of T59N, R14W. Corps. Shaded area shows survey area. Black dotted lines are trails shown by Trygg (1966). See also Report Map 21.

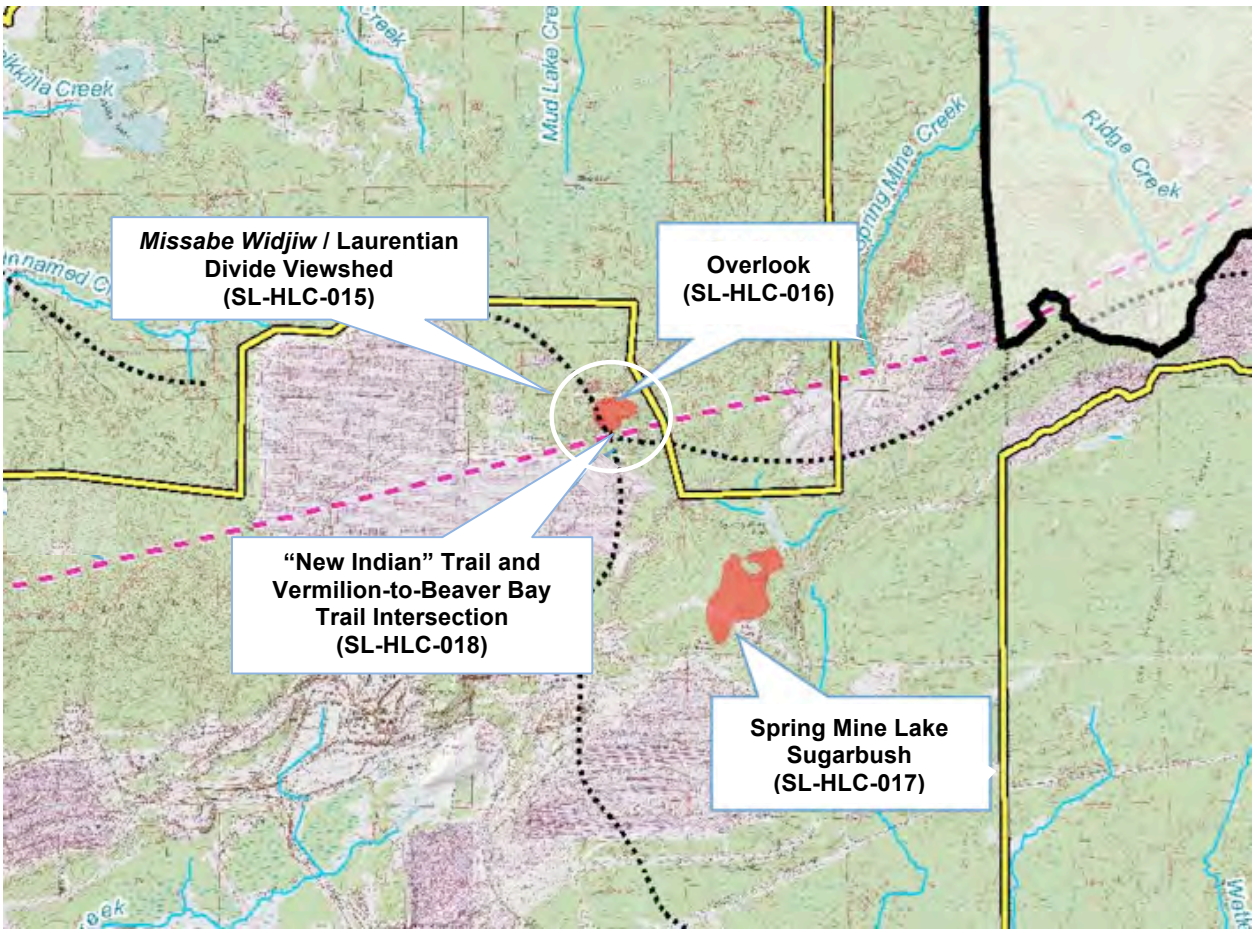

Figure 7. Overlook and *Missabe Widjiw* Viewshed in Section 3 of T59N, R14W. Dashed pink line shows approximate summit of *Missabe Widjiw*/Laurentian Divide. White circle shows approximate viewshed from Overlook. Indian Trail Intersection and Spring Mine Lake Sugarbush also shown.

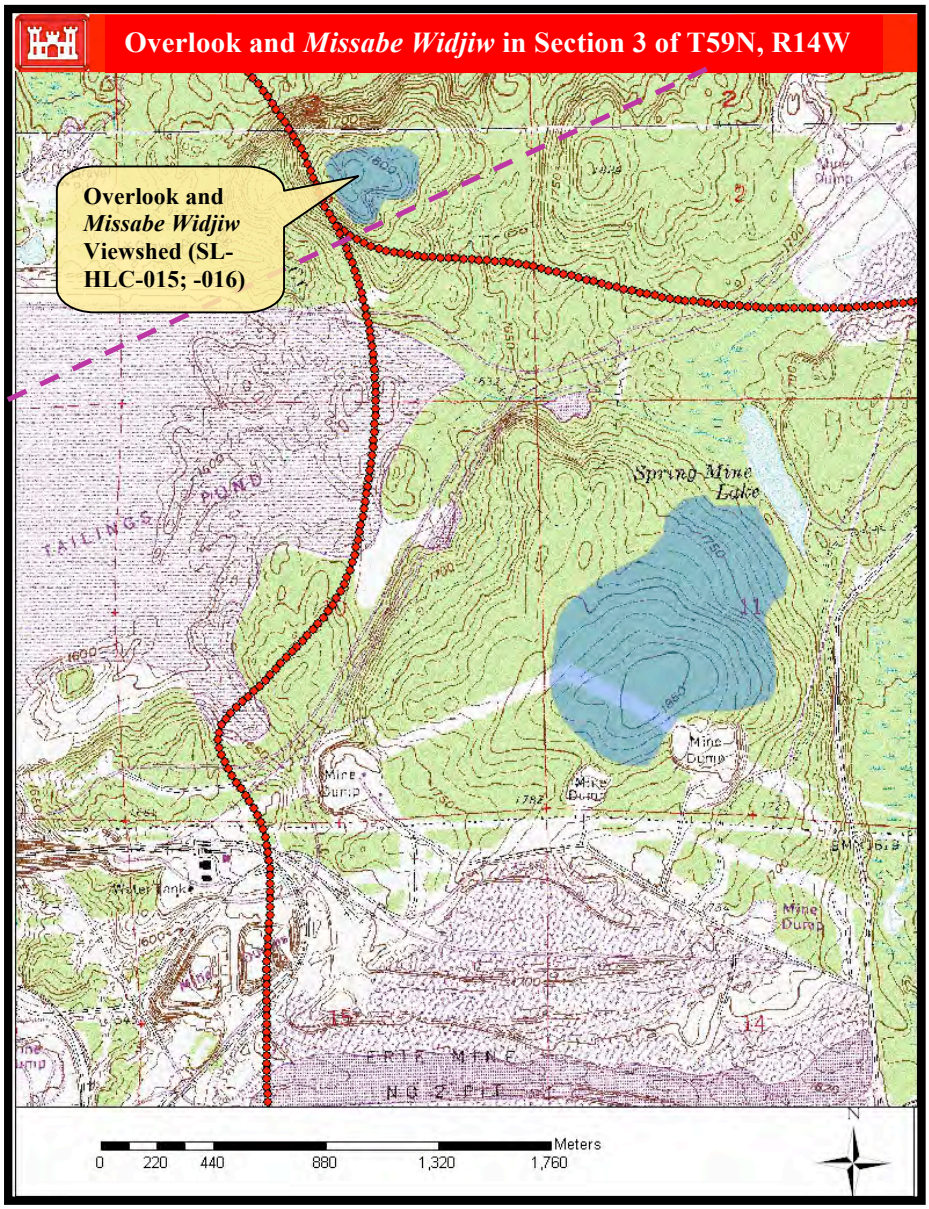

Figure 8. Overlook and portion of *Missabe Widjiw* Viewshed in Section 3 of T59N, R14W. Corps. Dashed pink line shows approximate summit of *Missabe Widjiw*/Laurentian Divide.

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6.11
Lee Johnson
Annotated Bibliography and Historic Context Study:
Beaver Bay (*Gagijiken Sikag*) to Lake Vermilion (*Onamanizaaga`igan*) Overland Trail.
Superior National Forest Headquarters, Duluth, 2012.

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Annotated Bibliography and Historic Context Study: Beaver Bay (*Gagijiken Sikag*) to Lake Vermilion (Onamanii-zaaga`igan) Overland Trail

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April 2012

Grey Literature/Bibliography of Source Information: Historic/Historic Ojibwa Overland Trails in the Arrowhead Region

Lamppa, Marvin, "Ashawiwisitagon: The Land Where Rivers Run Two Ways", Range History, Winter 1983.

Lampaa discusses the general history, context, and the visibility of the Height of Land Portage from Sabin Lake to the Embarrass River in the 1940's. Discusses seeing blaze marks and portions of the old trail intact "five hundred yards north of the Upper Embarrass River, in a perfectly straight line and so packed down in places that neither brush or trees had found root it in" (pg. 2). Lampaa describes Ashawiwisitagon as the land where the waters run two ways, an area which is described by the Ojibwa as the hills, rocks, and swamps between the south flowing Embarrass River and the north flowing Pike River. The third and longest of the portages crossed a height of land, the Laurentian Divide. The route was used by the French prior to 1763, and was referred to as the portage of *Twelve Poses.* Lampaa goes on to state that he believes the route was one of great importance to the early French exploration of the Upper Country. He cites a 1740 *Carte Physique du Canada,* which shows both the Mesabi Hills, and the Wine-Sabin-Embarrass-Esquagama chain of lakes. Lampaa describes D. Thompson 1827 reference to the St. Louis route as the "most ancient" of routes to the interior. Short discussion on James Norwood's trip over the Height of Land portage in 1848, and the Ojibwa name used to describe the route. Lampaa cites Norwood's description of the landscape surrounding the Height of Land Portage, including a description of the *Mesaba Wachu,* or 'Big Man hills', which is described as being 300' high (4). Lamppa describes the Norwood and Owen reports and, particularly the Owen report of 1854, as being the impetus for prospecting in later years. Brief description of the 1865/66 Vermilion Lake gold rush, and a May 18th 1866 article in the St. Paul Pioneer that stated that the new town on the shore of Lake Vermilion "will soon be the center of population for 10,000 people" (4). Lampaa speculates that the gold seekers used both the ancient portage and, increasingly, a new trail cut by civil war veterans in the Fall of 1865 known as the Vermilion Trail (terminated at Winston City). In 1869 the trail was widened into a passable road connecting Duluth to Lake Vermilion by George Stuntz, who was under contract with the United States Engineers Department.

Burns, Mary "Preliminary Survey of Historical Routes and Trails in Northern Wisconsin and Upper Michigan". 1985

Burn's paper provides a preliminary survey of historic literature regarding historic overland trails and water routes of Northern Wisconsin and portions of the adjacent Upper Peninsula of Michigan. The focus of the paper is on routes utilized by Native Americans, fur traders, and early explorers, however Burn's also describes some military roads associated with the territorial/early statehood period. Burn's interoperates the early transportation network as an interrelated system, where "trails and water routes interconnect to form a large and intricate system of communication and transportation (1-2). Burn's reviews some of Wisconsin geology, topography, and hydrology, and explains how watershed divides, gaps, rivers, and lakes played into route development. Burn's also discusses how Wisconsin (similar to Minnesota) has many watershed headwater streams lying in close proximity to each other. She calls these linkages "interlocked headwaters," and uses the Brule-St. Croix River route as an example (4). Burn's suggests that the routes were developed by the Indians hundreds of years ago, and used for communication, trade, hunting, and warfare. She believes the routes were "highly developed" and used a "great deal" (5). Burn's provides a noteworthy quote from the 1914 Wisconsin Archaeologist on Page 5:

They had covered the entire country, like a prodigious spiderweb, with a network of trails through forest and mountain passes and across plains, connecting village with village, running to hunting grounds and bodies of water whence many derived the large part of their food supplies (Indian Overland Travelways, 1914).

Burn's states that the routes of Wisconsin, which provided access between the Mississippi, Lake Michigan, Lake Superior, and inland rivers and lakes, were subsequently used by the French beginning in the Mid-17th century. Burn's states that the Brule-St. Croix was of second importance to the Fox-Wisconsin route, which provided the French a critical link between Quebec and New Orleans (6).

Burn's discusses the role of Lake Superior in the route geography of Wisconsin, describing it as a "major thoroughfare for long distance east-west travel, with many route junctions along the shores"(9). She discusses the how village locations along the shores were located along major inland rivers or overland routes, and were thusly, "situated on axis of travel into the interior and along the Lake" (9). Burn's breaks her discussion on Wisconsin's route geography up between the Northwestern and North central regions, with the appendix providing excellent organization of routes by arbitrary numbers keyed into an attached map. The routes are organized by route name, major watershed, and connecting watershed, with annotated bibliographies included for each specific route. Although the books primary focus is on water routes, Burn's details multiple overland routes associated with Ojibwe villages at Chequamagon (St. Croix Trail), Lac Veux Desert (L'Anse), Lac Du Flambeau (Flambeau Trail), among others (16-18). Burns describes Chequamagon Bay, Lac Veiux Desert, and Lac du Flambeau as focal points for trails that acted as "hubs in the transportation network" (19). These specific locations afforded routes to many different sites and drainage systems. Burn's also includes some historic descriptions of travel along overland trails from missionaries, surveyors, and fur traders. According to Burns, the trail from L'Anse to Lac Veuix Desert was the most heavily and recently utilized of all the trails surveyed in her report. She

details usage of this trail system that appears to be similar to the usage of the Beaver Bay-Lake Vermilion corridor (Lee Johnson) on page 20. She indicates that the trail was used by LVD Band members into the 1920's to collect allotment checks. Additional routes connecting Lake Superior to LVD, which were used by the Ojibwe in the Upper Peninsula, included Big Iron River-Lake Gogebic and the Ontanagon Route. Burns also suggests that later pioneer and military roads that converged on LVD were "based partially on Indian trails" (21). Burn's suggests further avenues for study in her concluding remarks, and suggests that more archaeological work be completed in order to better understand the connection between archaeological sites and important routes. Burn's also suggests that in addition to water routes, "overland trails did exist and were used extensively in some areas. Often overland routes were more frequently used as means of winter travel" (25).

Davis, Jessie C., "Beaver Bay Original North Shore Village", St. Louis County Historical Society, 1968.

Davis provides concise information regarding the early settlement of the Beaver Bay, and the interaction among the settlers and the Ojibwa community. According to Davis, Beaver Bay was the most significant community (post 1854 Treaty) on Minnesota's North Shore between Grand Portage and Fond du Lac (ca. 1856 communities existed at Oneota, FDL, Park Point, and Superior, Wi). Davis describes the geography of Beaver Bay as being conducive to settlement (water power for mill, suitable landing for boats via. protected harbor, and stands of valuable pine in located close to the shore). Davis makes the claim that there were two interior routes to Lake Vermilion established from the Beaver bay area during the fur trade; one ran from Beaver Bay to Greenwood Lake, the other ran from nearby Pork Bay to Lake Vermilion (pg. 5). The visibility of tree blazes along the Pork Bay route is described into the modern era. Davis makes no mention of the trail to Greenwood Lake continuing on to Lake Vermilion. Makes mention of opening of Sault canal in 1855 (as well as signing of 1854 Treaty) as bringing in influx of prospectors into Superior, Wi., which was much more prominent than Duluth at that time. Detailed description of platting and preemption of the original Beaver Bay townsite by Clark, McLean, and Batiste in October, 1854 (pgs. 14-18); includes excerpts from Clarks journals, and original town site sketches. Davis also provides detailed account of connection between the land speculator Clark (civil engineer and surveyor out of Toldo, Ohio) and Christian Wieland, Clark's deputy surveyor, who would eventually settle and purchase apprx. 3000 acres of prime pinelands along the Beaver River. The townsite was registered on June 24, 1856. Five Wieland families listed at Beaver bay in the 1857 census (pg. 19). Davis reviews James Peet, a Methodist minister from Superior, diary entries for a visit to the Beaver Bay Community in August 1860. Pete makes no mention of Ojibwa community at Beaver Bay during his visit. Davis provides an interesting description of land speculation, preemption, and town site platting in NE Minneosota following the Treaty of 1854 (pgs. 22-24). Davis reviews the 1857 census data for Lake county, which describes 189 indians, and 59 foreign born individuals, many of who, resided at Beaver bay (pg. 27). In chapter 4 (pgs. 29-32), Davis provides some background on Beaver Bay's Ojibwa community. He again states that, "it is generally agreed that there were no Indians living in Beaver Bay when the Ohioan's (Wieland's) arrived in 1856". (29). Davis recounts many stories of sharing and goodwill between the early settlers and the Ojibwa, and states that many of the Ojibwa who came to Beaver Bay worked on road building, timber cutting, in the sawmill, and on the schooner Charley, owned by Albert Wieland (31). The Ojibwa were said to have lived in 'teepes' on the point by the lakeshore, and in cabins deserted by early settlers (presumably, by those settlers effected by the financial panic of 1857). Davis states that some of the Ojibwa came from Grand Portage, some from LaPointe, and some from Fond du Lac, although he says the Wiscops (Wiscob) had originated from Sault St. Marie, Mi (29). The Beaver Bay Ojibwa community included individuals from the Chattain, Druillard, Anaquette, Yellow Bird, Blue Sky, Beargrease (Moquabimetem), and Boyer. Davis references the 1865 and 1880 census data, and suggests the Beaver Bay indian community had grown to include the Shotlow, Morrison, and Naganab surnames (34). The 1880 census puts 41 indians and 65 whites at Beaver Bay. Davis describes the sawmill operated by the Weiland brothers near the mouth of the river in detail, as well as the logging operations and timber holdings on pages 38-39. Davis suggests that the Weiland's were able to maximize profits and make valuable connections with important mining speculators in the UP, as they brought their sawtimber directly to the markets in Ontanagon, Copper Harbor, Eagle Harbor, and Eagle River by way of the schooner Charley. It seems likely from Davis's description of the 1860-1875 timber activity at Beaver Bay, that Ojibwe were drawn to Beaver Bay as wage laborers in the Wieland's mills, schooner, and timber camps. Davis references the 1870 census data, which suggests that the Wieland brothers operated three water powered sawmills which employed 18 people over the age of 16 (40). The 1868 Marquette fire, which destroyed the majority of the booming mining town, provided a boon in business for the Wieland's sawmill; Davis describes the schooner Charley making trip-after-trip to sell lumber to the stricken town. The Wieland's also expanded to Thunder bay, opening offices there and shipping timber directly to support the silver mine at Silver Islet (1868) and later, for the military road associated with the Reil rebellion (41-42). Davis suggests that the Wieland's mill and docks closed around 1905, when larger timber corporations moved into the area and began purchases large swatchs of timber away from the lakeshore (43). Davis discusses the development of local roads in chapter six, including the "Beaver Meadows road, or the Henry Wieland Road, which ran from the mouth of the Beaver River apprx. 6 miles to a point of the West Fork Beaver river (45). It was at the end of this road, that Davis states that the settlers first encountered the Ojibwe (ibid). Davis gives attention to the "Indian Trail" on pages 45-46, where he considers the settlers description of the "Old Road", the "Back Road", and the Lake "Shore Road", all of which appear to be terms used to describe a trail that ran in from the

lake shore that connected Beaver Bay to Fond du Lac. Davis mentions Chester's 1875 and 1880 geologic expeditions, in which Chester mentions, on both occasions, passing the "unoccupied cabin of Chief Beargrease" (46). Chester's expedition notes suggest that he traveled to the Mesabi and Vermilion Ranges from Duluth, by way of the St. Louis River "Height of Land Portage" and the recently constructed Vermilion Trail. It is unlikely that Chester took the Beaver Bay-Greenwood-Lake Vermilion route during the 1875/80 expeditions. Davis also references "Adair's Plat Map", which is said to depict a trail called "the New Trail to Buchanan", which, according to Davis, would later be known as Beargrease's mail route (Buchanan is the old term for Knife River). Davis references settler's accounts of the Beaver Bay Ojibwa sugarbush in the following account:

> *Indian children attended school at Beaver Bay, but when March came around, they were taken out of school for several weeks to go with their parents to the Sugarbush. The route was through valley and over hill on a trail of that same name, and they brought back with them maple syrup and "sticky maple candy", according to John Slater, which they traded for salt pork (57-58).*

Davis attributes the connection between the Ontanagon syndicate and the Wielands to the Lake Trade, and suggests it was during the lumber trade to Ontanagon that the Wielands brought samples of iron ore that the Indians "who traveled from inland Greenwood Lake" had brought them (64). Davis cites a 1937 letter from Fred Wieland to EA Schulze, that appears to suggest ore samples were brought down the Beaver Bay-Vermilion trail by local Ojibwa. Davis spends considerable time detailing the 1865 Eames party expedition to the Vermilion and "Messabay Heights" from Beaver Bay which was guided by Wieland and local Ojibwa (64-68). Davis cites Dr. Henry Eames report, which described the overland route to the Mesabi in detail. Eame's discussion of the route roughly corresponds to the "Beaver Bay-Vermilion Trail" depicted by J.W. Trygg: "From Beaver Bay following a course 45deg west of north about 55 or 60 miles, Vermilion Lake is reached, after passing the heads of the Beaver, Cloquet, Big White Face, St. Louis and Upper Embarrass Rivers" (65). Davis describes this route as the "Greenwood Trail", and goes on to suggest that it exists as an unnamed line on later maps, including N.H. Winchell's 1901 map. According to Davis, the trail ran from the west side of the North Branch of the Beaver River to the southeast side of Greenwood Lake (66). The location described on Greenwood Lake corresponds with a sugarbush/Indian village depicted on the original GLO survey notes…it would reasonable to assume that this is the sugarbush that Beaver Bay Ojibwa traveled to in the spring (my interpretation). Davis described the route taken from Greenwood Lake to Babbitt as consisting of "waterways and portages", rather than an overland route (66). Davis is likely referring to the Greenwood River, Stony River, Birch Lake route that Stuntz and others used to access the Vermilion Range (from Birch Lake the route went through White Iron, Fall, Shagwa, Burtside, Burntside River, Mud Creek portage, into Vermilion). On the return trip with Eames, Wieland is said to have collected iron ore samples from the "Messabay", which he subsequently took to Ontanagon and delivered to individuals who later comprised the "Ontanagon Syndicate", a pool of speculators that attempted to develop the Mesabi Range in the 1870's. Davis discusses the increased exploratory traffic into the Vermilion region, and the state legislators passage of a roads bill in February 28, 1866, that called for the construction of a road from Beaver Bay to Lake Vermilion (67). Henry, Christian, and Ernst Wieland partially financed the road efforts by securing backing from unidentified Ontonagon "capitalists". The Wieland's cut a winter road to Greenwood Lake and built a warehouse in the spring of 1866. They moved supplies to the warehouse in stages, but financial backing was lost during construction. Henry Wieland's son moved to the warhouse the following winter and traded the remaining supplies with the Ojibwa for furs (67-68). Interestingly, the SNF site files include at least three historic building ruins on the west shore of Greenwood Lake, near the junction of the Beaver Bay-Vermilion Trail and the lakeshore (my interpretation). Davis describes the 1870 Peter Mitchell expedition to the Mesabi Range from Beaver Bay, which was funded by the Ontanagon Syndicate (68-70). Davis describes Mitchell taking multiple trips to the Babbitt area, where he was often accompanied by Christian Wieland and "some of the Indians from the Bay who helped sink test pits into the hard rock" (68). Davis describes Mitchell lobbying Senator Ramsey to have C. Wieland appointed as government land surveyor for the lands in which the Ontanagon Syndicate was interested (68-70). After receiving the appointment, Christian Wieland, Henry P. Wieland, and Peter Grasshopper (assumed to be Beaver Bay Ojibwa) surveyed T59/60N, R13/14W in the winter of 1872. The Ontanogan Syndicate eventually consolidated ownership of 5880 acres in this area (69). The company was set back by the National Panic of 1873, but eventually incorporated the Mesabe Iron Company in 1876. Included on the letters of incorporation were WW. Spalding (from ontanagon and owner of the Spalding hotel in Duluth); William Harris, WD Williams, Linus Stannard, James Mercer, Alexander Ramsey (Minneosta Governer), and Henry p. Wieland. The Ontanagon Pool organized the Duluth and Iron Range Railroad in 1874 to develop the Missabi, but iron ore focus shifted to the Vermilion Rnage when Albert Chester's 1875 geologic report was published. Davis provides a detailed description of the demise of the Mesabe Iron Company in the 1880's, and the buyout of the syndicates Duluth and Iron Range Railroad by Charlemenge Tower in 1882 (71-74). Davis provides some family tree records in the appendix. These records include some of the more prominent Ojibwa residents of Beaver Bay. Davis bibliography includes roughly 150 footnotes

Duluth News Tribune ca. 1878-1910, on microfiche at St. Louis Co, Historical Society, Duluth.

Various mention of overland trail use among Ojibwe. Ojibwe travel to interior sugar and rice camps mentioned from Minnesota Point summer grounds. Specific reference to Eames and Stuntz geologic expeditions into the Vermilion and Mesabi Ranges. Additional research needed.

Zedeno, Maria N., and Richard W. Stoffle. "Tracking the Role of Pathways in the Evolution of a Human Landscape: The St. Croix Riverway in a Ethnohistorical Perspective" in *Colonization of Unfamiliar Landscapes: The Archaeology of Human Adaptation.* 2003.

Theoretical paper regarding the importance of traditional geographic knowledge and the role of trails in establishing cultural concepts of territory. The author focuses on both water and overland routes utilized by the Ojibwe in the St. Croix River region of Minnesota and adjacent Wisconsin in the mid-19th century.

Two Harbors/Beaver Bay Newspapers ca. 1890-1920, on microfiche at Lake County Historical Society, Two Harbors

Various mention of overland trail use among Ojibwe. Specific reference to trail along the North Shore that preceded Highway 61. Small notes relate Ojibwe movement to interior sugar camps in the spring months. Specific reference to Beargrease. Additional research needed.

Grand Marais Newspapers ca. 1895-1920, on microfiche at Grand Marais Public Library, Grand Marais.

Consistent reference to occurrences in the Chippewa City, and travel between Beaver Bay and Grand Portage by noted Ojibwe individuals. Mention of significant Ojibwe wage labor presence during construction of Grand Marais Harbor. Additional research needed.

Field Notes of the Exterior and Subdivision Lines of Township No. 59 N Range 13 W of the 4th Principal Meridian, 1873. Government Land Office.

Field Notes of the Exterior amd Subdivision Lines of Township No. 59 N Range 13 W of the 4th Principal Merridian, 1873.
References to trails:
Pg. 6 – "S 24 W over a true line bet. Secs. 7 & 12"
"22.40 Trail from Beaver Bay to Vermilion Lake N6 & 5W"

Pg. 24 – "East on a random line between Sec. 1 & 12"
"45.00 Trail from Beaver Bay to Lake Vermilion NW & SE"

Pg. 25 – "North on a random line bet. Secs. 1 & 2"
"45.26 Trail from Beaver Bay to Lake Vermilion NW & SE"

Pg. 33 – "East on a random line between Secs. 3 & 10"
"61.10 Trails Indian, North"

Field Notes of the Exterior amd Subdivision Lines of Township No. 60 N Range 13 W of the 4th Principal Merridian, 1872.
No references to trails.
Survey notes indicate that large populations of woodland caribou were present in the vicinity of the 100 Mile Swamp near present day Babbitt in the mid-1870's. The surveyor suggests, in his running notes, that the area could serve as "caribou refuge". The passage could suggest that area Ojibwe used the Beaver Bay-Lake Vermilion Trail to access caribou wintering grounds.

Lancaster, Daniel. "John Beargrease: Legend of Minnesota's North Shore". Holy Cow Press. 2009.

Christian Weiland's connection to Thomas Clark, a civil engineer and surveyor residing in Superior, WI in the 1850's, is discussed along with the platting of the Beaver Bay townsite by the two men in 1856 (pg. 17). Lancaster described Weiland's excitement in the townsite, and his request that his extended family in Ohio sell their property and move to Beaver Bay, which they did in June, 1856. That same month, the Weiland brothers bought and took possession of all land

rights initially pre-empted by Clark. The Weilands are described as arriving in Beaver Bay on the steamship Illinois, along with 22 other German speaking homesteaders. Lancaster cites a passage by James Peet, a traveling Methodist missionary working amongst the North Shore Ojibwa, who observed the progress of the German homesteaders in the fall of 1856 (pg. 17-18). Peet describes the improvement the German homesteaders have made to the land (hay fields, houses, barns), the presence of a post office and store, but does not mention the presence of Ojibwa families at that time (17). Lancaster described Henry Weiland's homestead as being "160 acres along the river five miles from the village in an area called West Beaver Meadow". Lancaster goes on to state that it is here, in West Beaver Meadows, that the homesteaders first encountered Ojibwa in the summer of 1858 (18). That same summer, according to Lancaster, two Ojibwa families, the Anuquettes and the Morrisons, built wigwams on the gravel peninsula at the mouth of the river. The families were reported to have traded to an advantage at the general store, and fished and hunted through the late-summer, before returning to Grand Portage in the fall (18). Otto Weiland is cited as saying that the Ojibwa "had come to Beaver Bay off and on for many generations and knew the region well", but for the first several years of settlement, none resided at Beaver Bay permanently (19). Within 20 years of settlement, however, Ojibwa would account for nearly 40% of the entire population of Beaver Bay (ibid). Lancaster goes on in page 19 to discuss the affiliation of the Ojibwa who later resided at Beaver Bay:

> The Beaver Bay Indians were mostly from the Grand Portage band. They were known as Clan of the Bear. Only a small number of the Grand Portage band actually lived on the Grand Portage reservation that the treaty of La Pointe had allotted to them. The rest were scattered about in small clans. The Caribou clan settled at Grand Marais. The Crane clan dominated Grand Portage. The Beaver Bay Indians were predominantly of the Bear clan. The 1860 Federal Census lists Paul Musquish as the leader of the Beaver Bay band, a relative of Louis Maymushkowaush, a chief from Grand Portage and one of the signers of the Treaty of La Pointe. Within five years, several more anishinabe families had joined the Beaver Bay community. The Makasabetows, the Shotlows, the Sakakees, the Naganabs, the Yellowbirds, more Morrisons, and the Wishcops. Sometime after 1870, Chief Beargrease, the father of John Beargrease, arrived with his wives and children. Within a decade, forty-one Indians and sixty-five whites lived in Beaver Bay.

Lancaster details interaction among the German immigrant families and the Ojibwa in pages 19-23. As Skilling and Davis stated in previous works, which Lancaster cites, the two cultures are described as interacting amicably, with the Ojibwa teaching many of the homesteaders how to hunt, fish, travel in the winter, and run trap lines. Lancaster states that, as time progressed and the Ojibwa were integrated into the community, they abandoned their wigwams for cabins; many of which were built by the Weiland's (22). Prior to the Mayhew's establishment of a store in Grand Marais and the evolution of Two Harbors into a full-fledged railroad/shipping community, the Weiland's general store in Beaver Bay was the only supply post between Grand Portage and Duluth. The Ojibwa were also said to have received "fairer trades for their peltry among the honest Germans" than they could elsewhere (22). Lancaster also described "Visiting Day", which occurred amongst the early settlements on the North Shore who invited Ojibwa into their homes to exchange treats and baked goods…the festivity's were enhanced by the Ojibwa having recently received their annual annuity payments as stipulated in the Treaty of La Pointe. Lancaster details the wage labor relationship between the Ojibwa men and the Weilands sawmills, timber harvest crews, and transportation of milled lumber to the burgeoning mining towns of the Up in the Schooner Charley (23-25).

In chapter two (27-38), Lancaster provides a detailed description of the origins and tribal affiliation of the Beargrease family that came to reside at Beaver Bay. A 1870 letter from a Lake Superior Indian agent is cited as describing the "Beargrease Band of Bois Forte Indians" as a group of 97 Chippewa individuals who were, at the time, "living in isolation near Prairie Lake" near moder day Clouquet, Mn (27). The Beargrease Band had, as of 1870, never taken annuity payments, nor were they living with the majority of their tribe, the Bois Forte, when the government agent was informed of their community. Lancaster details correspondence between Lake Superior Indian Agent SN Clark and the commissioner of Indian Affairs in Washington DC, that discussed strategies to entice the Beargrease group onto reservations. Two Chiefs from the band, Moquabimetem and Mahjeheshig, were reported to be brothers born in the Rainy Lake district in the 1830-1840's. They are described as members of the Bois Forte Band, with family connections to Grand Portage and Nett lake. Mahjeheshig accepted the government offer to relocate to the Fond du Lac reservation, but Moquabimetem (Beargrease) relocate to the North Shore community of Beaver Bay between 1870-75, where he was welcomed by the community and honored as a chief (28). Chief Beargrease, the father of the more infamous John Beargrease of North Shore dog sledding fame, brought two wives with him to Beaver Bay, and is reported to have taken more after his arrival. Lancaster cites census reports annuity records on pages 28-33, by which he provides a fairly detailed account of the Beaver Bay Beargrease family genealogy ca. 1870-1900. Continuity of the seasonal round is referenced in pages 34-35, wherein Lancaster details spring sugarbush locations and travels inland from Beaver Bay to fish lakes and gather wild rice: "The annual migration to the sugar bush was such a regular rhythm of life in Beaver Bay that the road north to the camps was called the Sugar Bush Trail. Davis reports that the Trail left Beaver Bay 'Town Road' to climb over the hills east of Beaver Bay at the intersection where today stands the Silver Bay traffic light on highway 61". Lancaster notes that the seasonal migration to resource catchment areas and Beargrease's work as a mail carrier "likely explain the occasional gaps in the census records where Beargrease names vanish in a particular year, only to reappear later" (35). Lancaster describes occurrences of "Ghost Dances" taking place on the gravel peninsula separating Beaver

River from the Bay, and described many of the Beaver bay community participating, despite their conversion to Catholicism. Anectotal information regarding use of the Beaver Bay to Lake Vermilion overland trail to collect annuity payments is provided in a letter written by a settler in Beaver Bay for a member of the Beargrease family. Lancaster also cites the letter as certain evidence of a connection between the Beaver Bay Beargrease family and the Nett lake beargrease family:

> Beaver Bay, Minn. Dec 13/83 Dear Sir, The Indians in the neighborhood would like to know from you at what time about, the payment at Vermilion will come off please drop a card stating about the time within a week or so befor the time that payment will be at Vermilion Lake and very much oblige. Beargrease Indian at Beaver Bay, Lake Co. Minn.

Lancaster reports that Chief Beargrease died sometime around around 1885, as this is the last mention of him in the census records (37-38). His son, Eshquabi (John) Beargrease, soon inherited his father mail route and married a local Ojibwa, Louise, from the Wishcop family. John and Louis traveled back to Grand Portage, her family home, after the death of their infant son. Between 1882-85, John and Louise moved up the shore and John found work in the massive harbor project taking place in Grand Marias (49). Lancaster provides a detailed genealogical account of John and Louise's family taken from census and annuity payment records on pages 49-54. Additional information regarding the collection of annuity payments at Lake Vermilion by Beaver Bay Indians is provided on page 54, where Lancaster cites a letter from La Pointe Agency at Lake Vermilion detailing the illegal sale of whiskey to Indians (including Beargrease), which occurred after the annual annuity payments were collected at Lake Vermilion, 16th January, 1886 (54-55). A description of late 19th century developments along the north shore, the North Star Mail route, and Beargrease exploits as a mail carrier is captured in pages 57-86. Chapter 7 provides direct reference to Beargrease's travels inland to run trap lines along the Beaver Bay-Vermilion Trail, and developments on the Greenwood Lake Road, which formed the southern segment of the Beaver Bay to Lake Vermilion Trail. "Beargrease kept outlying cabins so he could be attentive to his trap-lines. His dogs, once necessary for the winter mail routes, proved useful for hauling supplies and pelts up and down the trap-lines to his cabin and back"(88). Lancaster goes on to describe Beargrease's use of the "Road to Greenwood Lake", a portion of the Beaver Bay to Lake Vermilion trail that is also discussed at length by Davis and Skillings:

> According to one report, John Beargrease had trap-lines as far out as Greenwood Lake toward Ely, Minnesota. A partially built road once ran in that direction between Beaver Bay and Greenwood Lake. The Minnesota State Legislature had passed an act authorizing the construction of a state road from Beaver bay to Lake Vermilion in 1866. Rumors of gold and mineral riches in northern minneosta had prompted the leglislature to appoint the Weiland brothers as road commissioners with the responsibility of building a road that would be passable by stagecoach. Working with a group of investors, the Weilands set to work cutting a road along the *Old Greenwood Trail,* which spanned the seventy-some miles between Beaver Bay and Lake Vermilion. They made it as far as Greenwood Lake where they constructed a wharehouse, but their funding suddenly collapsed. The teenaged HP Weiland spent the winter of 1866-67 alone in the warehouse as he traded the remaining supplies with local Indians (90-91).

Lancaster goes onto describe Beargrease's later use of the trail corridor for trapping, and further emphasizes his use of the trail corridor by citing a medical record from 1901 that lists his residence as Ely.

Skillings, Helen Weiland *We're Standing on Iron: The Story of the Five Weiland Brothers 1856-1883,* 1972. St. Louis Co. Historical Society, Duluth.

Wieland brothers purchased their own schooner, the Charley. Albert Wieland became the master of the schooner. He was assisted by John Morrison and half-blooded and Chippewa Inidans, including Chief Beargrease and Antoine Mashowash, who proved to be able navigators (page 15). The Wielands were not enthusiastic hunters and fisherman, and the game and fish that the Indians supplied to them always were accepted gratefully (page 21). Reverend Lueder was astonished to see Indians in one of church services in Beaver Bay. He spoke in German and the Indian's spoke back to him in German (page 25-26). Two families, on Indian and one half-blooded, would leave for Grand Portage in the fall to receive their gov annuity (page 33).

In the spring, the Indians would depart for the sugar camp where they made maple sugar. (page 36)

November 10, 1873, special meeting of the county commissioners was called with the road commissioner present. Proposal that the area between Beaver Bay and … (page 44-45)

1865? The first authenticated discovery of iron ore in northern MN was made by Christian Wieland (page 49)

Christian Wieland consented to lead the Eames party. Henry, Christian, and Ernst Wieland and seven mostly halfblooded mill workers left for the supposed gold fields. Heading in a northwestern direction they came to Greenwood Lake and then continued on their way to Lake Vermilion. The blazing of this trail was the first penetration of the wilderness north of Beaver Bay (page 50).

Christian Wieland brought to these friends for their inspection samples of ore from both the vermilion and eastern Mesabi range (page 51).

The region north of Beaver Bay was impenetrable wilderness, and the opening of the trail that Eames party used in 1865 was hardly adequate for the transportation of men and needed supplies to the newly discovered ore fields. An act passed by the state leg and approved on Feb. 28, 1866, provided for a state road extending from Beaver Bay to Lake Vermilion. The region north of Beaver Bay was impenetrable wilderness, and the opening of the trail the Eames party used in 1865 was hardly adequate for the transportation of men and needed supplies to the newly discovered ore fields. An act passed by state legislature and approved on Feb. 28, 1866, provided for a state road extending from Beaver Bay to Lake Vermilion (page 52)

Peter Mitchell, a member of the Syndicate was selected as the qualified man to go into the ore fields for further exploration and test pitting. After the construction of the road to Greenwood Lake, the Wielands built a small warehouse on the shore of the lake where needed supplies and equipment are stored. This became their base of operations. (page 52)
Mr. Mitchell, accompanied by sever Wielands and other personnel, including half-blooded Inidans, made the first trip to the eastern Mesabi range in the spring of 1870 (page 52)
The only road construction in 1866 of which there is a record is the road the Wielands built from Beaver Bay to Greenwood Lake. A well-used Indian trail was followed to Lake Vermilion (footnote on page 52)
In the reports of the Commissioner of the GLO for 1872, under a contract made on Jan. 8, of that same year, Christian Wieland is listed as having surveyed the following area in St. Louis county…rest of (page 53).
"The name Mesabi is use by the Ojibway Indians in referring to a fabulous giant, who was supposed to have made this district his dwelling place, and by whom various boulders, which are numerous in that vicinity were supposed to have been used as ammunition in killing…" (page 53-54)
Ramsey's diary discloses that on two occasions in the fall of 1872, Mr. Wieland, Mr. Willard, and CL Brown, the surveyor general, met at Mr. Ramsey's home in St. Paul for discussions relating to the progress of the work. Upon completion of the survey, Ontonagon Syndicate members became the owners of about 9000 acres of land in Township 60 N, Range 12 and 13 W on the eastern Mesabi Range… (page 54)
Upon sudden death, only July 5, 1874, of William Willard, the most important and influential member of the Ontonagon Syndicate, all mining operations of this Syndicate in northern MN ceased. The warehouse at Greenwood Lake, containing equipment and supplies, became a temporary trading post with Henry Wieland Jr. in charge. Speaking Chippewa fluently, Mr. Wieland exchanged a large portion of these supplies with the Indians for furs. (page 55)
Probably the idea of a trading post at beaver bay evolved from the warehouse stored with mining equipment at Greenwood Lake that became a temporary trading post in 1874. (page 66)
When the settlers arrived at Beaver Bay in 1865, no Indians were there. At least two years elapsed before the first Indian made his appearance in the settlement. Surely, Thomas Clark II and RB McLean, who were on an exploring trip to Grand Marais in the fall of 1854, would have mentioned an Indian Village at Beaver Bay. At this site they make a prolonged stay as they were interested in platting a town sites on the north shore. In neither diary is a mention made of an Indian village at Beaver Bay. (page 67)
Early in August 1856, the Rev. James Peet, a Methodist missionary, made a trip down the north shore with several companions for the purpose of performing missionary work among the settlers. If an Indian village had been situated there, he surely would have mentioned it in his carefully kept day –by-day diary. (page 67)
Christian Wieland's work as deputy government surveyor took him to the area north of Beaver Bay, but he was the only one of the brothers who became well acquainted with this part of Minnesota. (page 67)

Luukonen, Larry, "Between the Waters," Dovetail Press, Duluth, 2007.

While the focus of Luukonen's book is the Northwest Trail between Fond du Lac and Mississippi River (St. Louis River/Savannah River/Sandy Lake), Luukonen also provides general context for winter overland trail use during the Fur Trade period 1780-1805. Luukonen references an overland winter road connecting Fond du Lac with Sandy Lake, and also cites numerous narratives which describe shorter, *une derouine,* winter fur gathering trips taken by dogsled (48). Luukonen relates John Hay's 1794 account of the difficulties of traveling water routes in NE Minn. during low water events in the summer, and goes on to state that many fur trade depots would stockpile goods to be transported inland during the winter by dogsled (49-50). Luukonen references Paul Beaulieu, a government interpreter, depiction of winter travel from La Pointe to Sandy Lake. Luukonen also references William Aitken and Reverend Edmund Ely's accounts of winter travel along the Northwest route in the early 19th century (51). Luukonen suggests that the role of winter transportation in the fur trade is, perhaps, understated and that winter routes played a pivotal role in opening up the country and maintain commerce in the 18th-early 20th century. Luukonen describes travel between NE Minnesota's fur trade posts and native villages as situated in a "year-round commercial crossroads", where trails "radiated out from centers like spokes in a wheel" (52). Luukonnen cites Ely's accounts of winter travel by dogsled between Sandy Lake and Leech Lake in 1834 (ibid). He suggests that the development of a winter route between Sandy Lake and La Pointe was crucial in order to transport good into the Mississippi watershed when water levels were low along the Grand Portage of the St. Louis. Luukonen provides anecdotal context for understanding the permanence of winter trails, stating, in reference to the La Pointe to Sandy Lake route, that "the exact locations of parts of the trail is difficult to determine. Like

most winter trails, portions of it disappear in the spring along with the melting snow. Only the general route would have been carefully noted by sled drivers who used it every season" (53).

Lamppa, Marvin "Minnesota's Iron Country: Rich Ore, Rich Lives," Lake Superior Port Cities Press, Duluth, Mn. 2004

Lamppa's publication describes the history of northeastern Minnesota's Iron Range, dating from prehistory to the early 21st century, as well as the settlement of Beaver Bay. The use of an overland route from Beaver Bay to at least Greenwood Lake is referenced from Lamppa's work in Chapter 4 "From Gold to Iron", which is roughly between the years of 1854-1880 (pgs. 39-53). Lamppa begins by emphasizing Lake Vermilion's mid 1800's gold rush as prospectors took vast time and money to identify and extract the highly wanted resource, but the amount of gold was not sufficient enough in comparison to the time and money it took to extract. It's mentioned that the short-lived gold rush did open an overland road connecting Duluth to Lake Vermilion as well as exposing iron rich ore on the south side of the lake (43).

Lamppa gets more specific to overland use in the Beaver Bay area as he describes the Ontonagon Syndicate and the Wieland brothers in their exploration of the north shore of Lake Superior and Iron Range. Lamppa mentions that the Wieland brothers (Henry, Christian, Ernst, Albert, and August), who emigrated from Germany to Ontonagon in 1849, were the first to settle in Beaver Bay after hearing about the vast resources on the north shore. After the brothers set up a sawmill, logged both sides of the Beaver River, and become lumber suppliers to towns in Michigan, Christian Wieland specifically was able to get to know the area north of Lake Superior well, including the native culture where he learned to speak Ojibway. Lamppa first mentions travels to Lake Vermilion via Beaver Bay in 1865 when State Geologist Henry Eames was directed by the governor of the state to investigate rumors of gold discoveries north of Lake Superior. Eames heard of Christian's familiarity of the area and hired him to take him to Lake Vermilion from Beaver Bay. Lamppa states "The route they followed took them to Greenwood Lake. From there they traveled by canoe to Birch Lake and camped at the mouth of the Dunka River" (46). Lamppa further goes on to state that as they made it to Lake Vermilion, Wieland went back to the Mesabi heights, south of Birch Lake, where he wanted a better look at the iron ore that they identified in the past. He then took samples back to Beaver Bay where he then traded for lumber supplies. Some of the samples were also brought to Ontonagon where mining men described them as "high-grade magnetic iron ore, similar to that of the Marquette Range" (46-47).

Lamppa's narrative on the Ontonagon Syndicate also indicates more exploration and travel within the Beaver Bay to Birch Lake extent. Lamppa illustrates how the Mesabi iron interest grew in Michigan and around 1869 a group formed called the Ontonagon Syndicate to figure out ways to gain title to the iron rich land. Members included Ontonagon businessmen, promoters, company owners, mine operators, mineralogist/prospectors, and a U.S. senator. Lamppa specifically mentions the examination of the ore by Peter Mitchell, an expert mineralogist and prospector. Mitchell, having expenses paid by the Syndicate, went out with some of the Wieland's and a party of miners in 1870 to explore the eastern Mesabi heights near Birch Lake. From that trip, Mitchell concluded that the area must contain rich ore below the exposed lean ore (47). Lamppa also mentions that Christian Wieland was appointed official government surveyor with the help of Ramsey where he appears to have begun his survey work in February of 1872. By September, Wieland was able to survey the two Mesabi Range townships, which eventually came into the hands of the syndicate members (48).

Lamppa goes on to mention how the syndicate went as far as creating the Mesaba Iron Company, proclaiming Alexander Ramsey as the president. The company never went beyond offering property to promoters. Lamppa describes that this was possibly due to Albert Chester's (professor of mineralogy) report in 1875, pertaining to the Mesabi ores as "lean" (48). Lamppa then references Chester's expedition in 1875 to mainly investigate the Ontonagon Synidicate's mountain on the Mesabi Range for Charlemagne Tower, a Pennsylvania promoter. Chester met his exploring party at a camp made near the Mesabi, which was close to Mitchell's work. Lamppa describes how they spent just one day surveying the Vermilion hematite deposits and then went back toward the Embarrass River where they found the trail that was cut to their main camp by Birch Lake. They then found some of Mitchell's test pits and took favorable samples of the ore, where Chester later determined "lean" in his report. Lamppa also references how the local Ojibway were used as mail carriers between the Chester camp and Duluth where they were telegraphed to Tower to get his weekly reports on the Mesabi exploration (50-51). Lamppa provides additional information on the Bois Forte Treaty of 1866, George Stuntz explorations on Vermilion, and land sales on iron range lands. Lamppa provides 68 endnotes for the specified chapter (251-252).

McLean, R.B., "Reminiscences of Early Days of the Head of the Lakes". On-file at the Superior NF Supervisors Office, Duluth, Mn.

McLean's unpublished account depicts his time at the "Head of the Lakes" between 1854 and 1900. Specific reference to commercial fishing operations, trading posts, travel routes, and early mineral exploration activities in the area from Fond du Lac to Grand Portage and points inland along the Border Route.

Vanden Heuvel, Richard J. "Cultural Resources Reconnaissance and Evaluation of the Lac Vieux Desert-L'Anse Trail, Ottawa National Forest". Final Report. Soil Systems, Inc. Bloomington, In . 1980.

Vanden Heuval's report provides a detailed historic context of the L'Anse to Lac Veiux Desert overland trail in Michigan's Upper Peninsula. The trail was utilized extensively by Lake Superior Ojibwe , traders, and missionaries from the early 18th century through the early 20th century. The LVD-L'Anse trail appears to have been a major conduit for the LVD Ojibwe during the fur trade through recent historic period. Vogels research suggests that the trail was utilized to access key hunting and gathering locations, and also for the purpose of collecting annuity payments in the winter months. The overland trail, as described by Vogel, shares many similarities with the Beaver Bay-Lake Vermilion trail. Vogel's report also details the difficulties encountered while attempting to relocate historic overland trails of this type using standard archaeological field methods. Vogel attempted, unsuccessfully, to isolate and test high-probability landscape features within the well documented trail corridor.

Vogel, Robert C. and David G. Stanley. "National Register of Historic Places Multiple Property Documentation Form: Portage Trails in Minnesota, 1630-1870s". National Park Service. 1991.

Vogel's MPDF provides a general framework for understanding overland trails as part of a larger transportation nexus, where water communication routes, portages, fur trade depots, First Nations settlements, and overland trails functioned as parts of larger transportation systems. Vogel's concept of route geography may provide a context for further understanding the role of overland trails (and potentially winter trails) within the larger, 18-20th century transportation system in Northeastern Minnesota.

Vogel, Robert C. and David G. Stanley. "National Register of Historic Places Registration Form: The Height of Land Portage". 1991.

USDA Forest Service, Ottawa National Forest. "Lac Vieux Desert-L'Anse Trail Corridor Plan Memorandum of Understanding, Lac Vieux Desert Band of Lake Superior Chippewa Indians and Keweenah Bay Indian Community". 2010.

The MOU between the Ottawa NF and the LVD Band provides general context for management of historic trail corridors of significance to the Lake Superior Ojibwe. The MOU sets standards for future land management activities within a defined corridor associated with the LVD-L'Anse trail on the Ottawa NF.

Hess, Demian. "National Register of Historic Places Multiple Property Documentation Form: Minnesota Red River Trails, 1835-1871". National Park Service. 1991.

Hess's MPDF provides context for assessing the significance of features and linear fragments of the Red River Ox Cart trails, ca. 1820-1870. While significant differences exist with regards to historic use, function, and archaeological signature, the Red River Trails may provide a means by which to examine broader historic transportation corridors themes in Minnesota, as they may relate to 18-20th century Ojibwe overland trails in the Western Lake Superior basin.

Anderson, Ken. Personal Communication. 2/23/2012

Ken Anderson, retired FS surveyor from Two Harbors District recalled observing intact portions of "Indian Trails" during the layout of the "Big 39" timber sale in 1967. Ken used the running notes from the 1873 surveys to chain-off from section corners and locate trail segments. Ken believed that much of the surviving trail segments were obliterated in the Big 39 sale. The Big 39 sale encompassed multiple townships near the intersection of Highway's 1 and 2. Ken also related that portions of the trail were once visible near Greenwood Lake. Full transcript on-file at SNF Supervisors Office, Duluth, Mn.

Schurke, Paul. Personal Communication. 1/26/2012

General discussion with Ely resident Paul Schurke regarding historic dogsled routes in the Superior National Forest. Paul also has a significant interest in historic Ojibwe land use and historic transportation routes in Northeastern Minnesota. Paul related his knowledge on Beargrease Island on White Iron Lake (where he lives), and the winter route from Greenwood Lake-Birch Lake depicted on Trygg Maps. Paul stated that it is his belief that many of the overland routes depicted on Trygg maps, especially those connecting the North Shore to points inland, were specifically utilized during the

winter. He also believes that these routes were utilized heavily in the recent historic period. He also related that spirit houses were visible on Beargrease Island into the Mid-20th century. Full transcript on-file at SNF Supervisors Office, Duluth, Mn.

Gibson, Kevin. Personal Communication. 2/12/2012

Kevin Gibson, retired Laurentian Ranger District Forester and heritage paraprofessional, provided Ken Anderson's contact information. Kevin related that Ken had attempted, with varied success, to relocate the Beaver Bay to Lake Vermilion trails during the 1960's. Kevin also stated that he heard of a cache of fur trade goods that were recovered near the confluence of the Stoney River and Birch Lake in the vicinity of the winter route from Greenwood Lake to Birch Lake depicted on the Trygg Maps. Kevin also believed that trail segments were visible in the Greenwood Lake area into the Late 1960's. Full transcript on-file at SNF Supervisors Office, Duluth, Mn.

Drouillard, Staci. "The Village of Chippewa City and the Grand Marais Chippewa: A Study in Place and Identity, 1850-1950" Masters Thesis, on-file at NE Minnesota History Cetner, UMD, 1987. Personal Communication 3/7/2012.

The full text of Staci's thesis was not reviewed during the course of study. Staci related that she had included references to overland travel among Ojibwe residents of Chippewa City, which is located near present day Grand Marais. According to Staci, there were well established winter routes between Grand Marais and Grand Portage, as well as points inland from the mid-19th century until the development of highway 61 in the 1920's. She also believed that inland routes continued to be utilized to access sugarbush, berry picking, and ricing locations into the mid-20th century.

Chamberlin, Thomas and Lyda C. Bethuis. "Beaver Bay Study". Papers on-file at NE Minnesota Historical Center, Duluth, Mn. 1948.

The outline and support research materials for application, "Research Grant for Beaver Bay Study." The study was done by Dr. Lyda C. Belthuis and Dr. Thomas W. Chamberlin who were at the University of Minnesota, Duluth, at the time. Photographs, history, fact sheet, newsclippings, and copies of maps, all pertaining to Beaver Bay, Minnesota. S3732.

Loftus, Michael K. "A Late Historic Period Chippewa Sugar Maple Camp". The Wisconsin Archaeologist, Volume 58, No. 1. 1969.

Loftus's article provides a summary of the archaeological features of a "Late Historic Period Sugar Maple camp" (the Spring Lake Mine sugarbush), which is located on the Lake Vermilion-Beaver Bay trail corridor, just adjacent to the currently proposed Polymet project area. Loftus's report is largely descriptive in nature, but he does reference oral accounts that indicate that the sugarbush was accessed by local Ojibwe by way of the Beaver Bay-Lake Vermilion Trail. Loftus suggests, although he doesn't elaborate on sources, that the site was "located in an area that seems to have been rather heavily utilized by the Chippewa during the later part of the nineteenth century" (71). Loftus also reviews the GLO survey notes and provides a detailed summary of historic overland trails present in the area in the late 19th century (71-72). Loftus does not cite his sources, but states that "local informants suggest that (Chippewa) movement to the grove was from the Embarrass and Wine Lakes area west of the grove and from the Embarrass River to the north" (73). Loftus suggests that the grove was utilized by local Ojibwe into the 1930's. Loftus goes on to provide a detailed description of artifacts (birch bark mukuks, paddles, and taps) and building features.

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6.12
NorthMet Project Cultural Landscape Study Final Report
Maps 1-21

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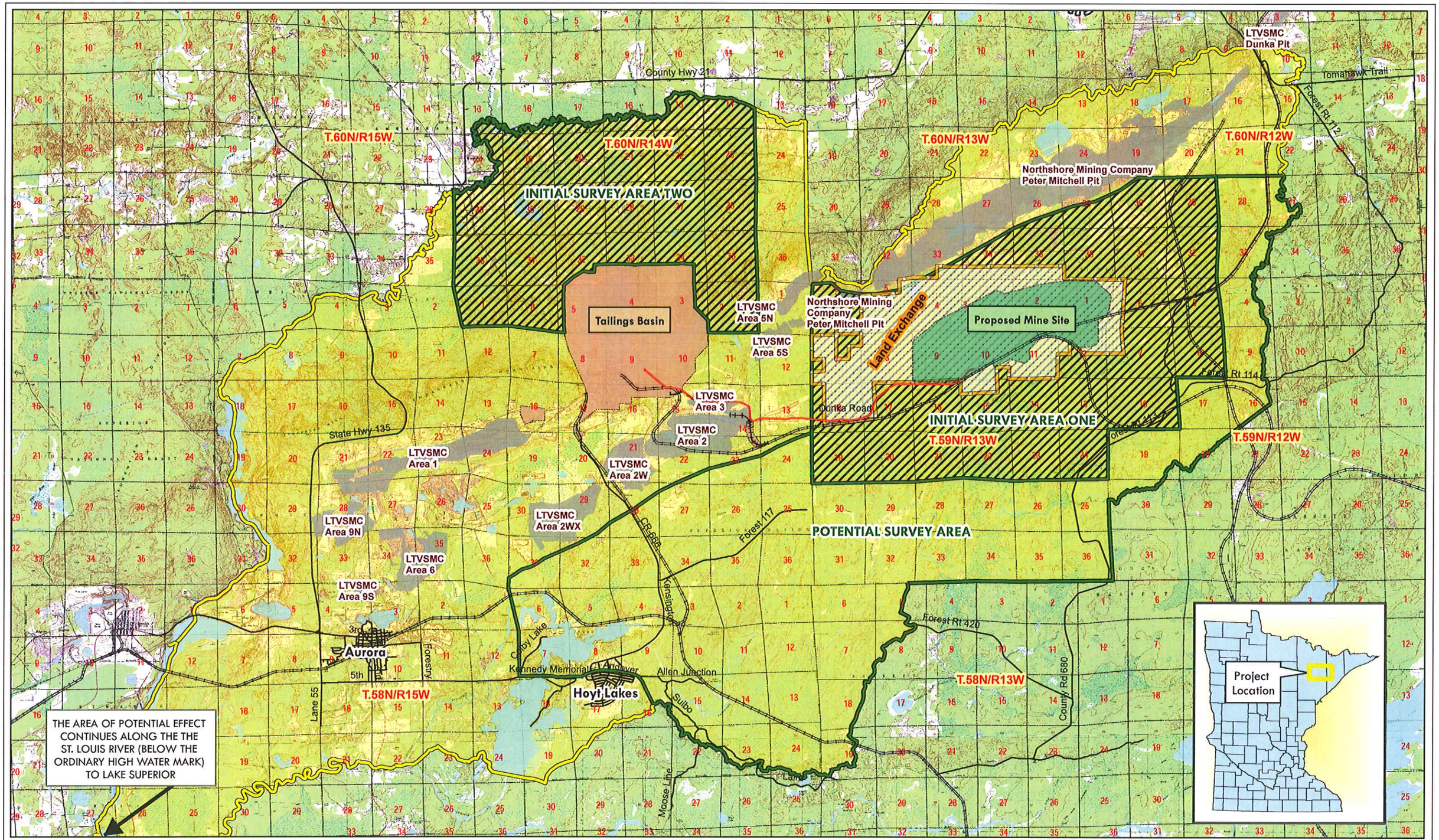

US Army Corps of Engineers
St. Paul District

Corps Proposed Areas of Initial Plant Surveys Located Within the Area of Potential Effect (APE)

NorthMet Project, PolyMet Mining Inc.
St. Louis County, Minnesota

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Initial Survey Area Two

Initial Survey Area One

Initial Survey Areas
Preliminary Area of Potential Effect (APE)

N

0 1.25 2.5 5
Miles

Map 2
PRELIMINARY APE AND INITIAL SURVEY AREAS ONE AND TWO
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

T60 R15
T60 R14
T60 R13
T60 R12
T59 R15
T59 R14
T59 R13
T59 R12
T58 R15
T58 R14
T58 R13
T58 R12
PETER MITCHELL OPEN PIT TACONITE MINE
MINE SITE
RAILROAD SPUR
TAILINGS BASIN
ERIE MINING COMPANY CONCENTRATION PLANT
RAILROAD CONNECTION TRACK
AURORA
HOYT LAKES
Embarrass River
Trimble Creek
Kaunonen Lake
Heikkilla Lake
Mud Lake
Spring Mine Creek
Spring Mine Lake
Yelp Creek
Stubble Creek
Hay Lake
Stephens Creek
Second Creek
Wyman Creek
Partridge River
Wetlegs Creek
Longnose Creek
Colvin Creek
South Branch Partridge River
First Creek
Colby Lake
Big Lake
135
100
110
130

Initial Survey Areas
Preliminary Area of Potential Effect (APE)
Project Areas
USFS Land Exchange Parcel
Rivers & Streams

N

0 0.625 1.25 2.5
Miles

Map 3
NORTHMET PROJECT AREAS
AND EXISTING RAILROADS
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Barr Footer: ArcGIS 10.0, 2011-06-24 10:39:49.305000 File: i:\Client\PolyMet Mining\Work Orders\Cultural Vegetation\Maps\Reports\Cultural Landscape Study\Map 3 NorthMet Project Area.mxd User: arm2

Barr Footer: ArcGIS 10.0, 2011-06-27 13:18:49, 790000 File: i:\Client\PolyMet Mining\Work Orders\Cultural Vegetation\Maps\Reports\Cultural Landscape Study\Map 4 Historic Resources.mxd User: arm2

T60 R15
T60 R14
T60 R13
T60 R12
T59 R15
T59 R14
T59 R13
T59 R12

Bear Creek
Embarrass River
Camp Eight Creek
Kaunonen Lake
Trimble Creek
Mud Lake Creek
Heikkilla Lake
Mud Lake
Unnamed Creek
Spring Mine Creek
Ridge Creek
Yelp Creek
Stubble Creek
Partridge River
Longnose Creek
Wrieg's Creek
CoMi Creek
South Branch Partridge River
Second Creek
Wyman Creek
Spring Mine Lake

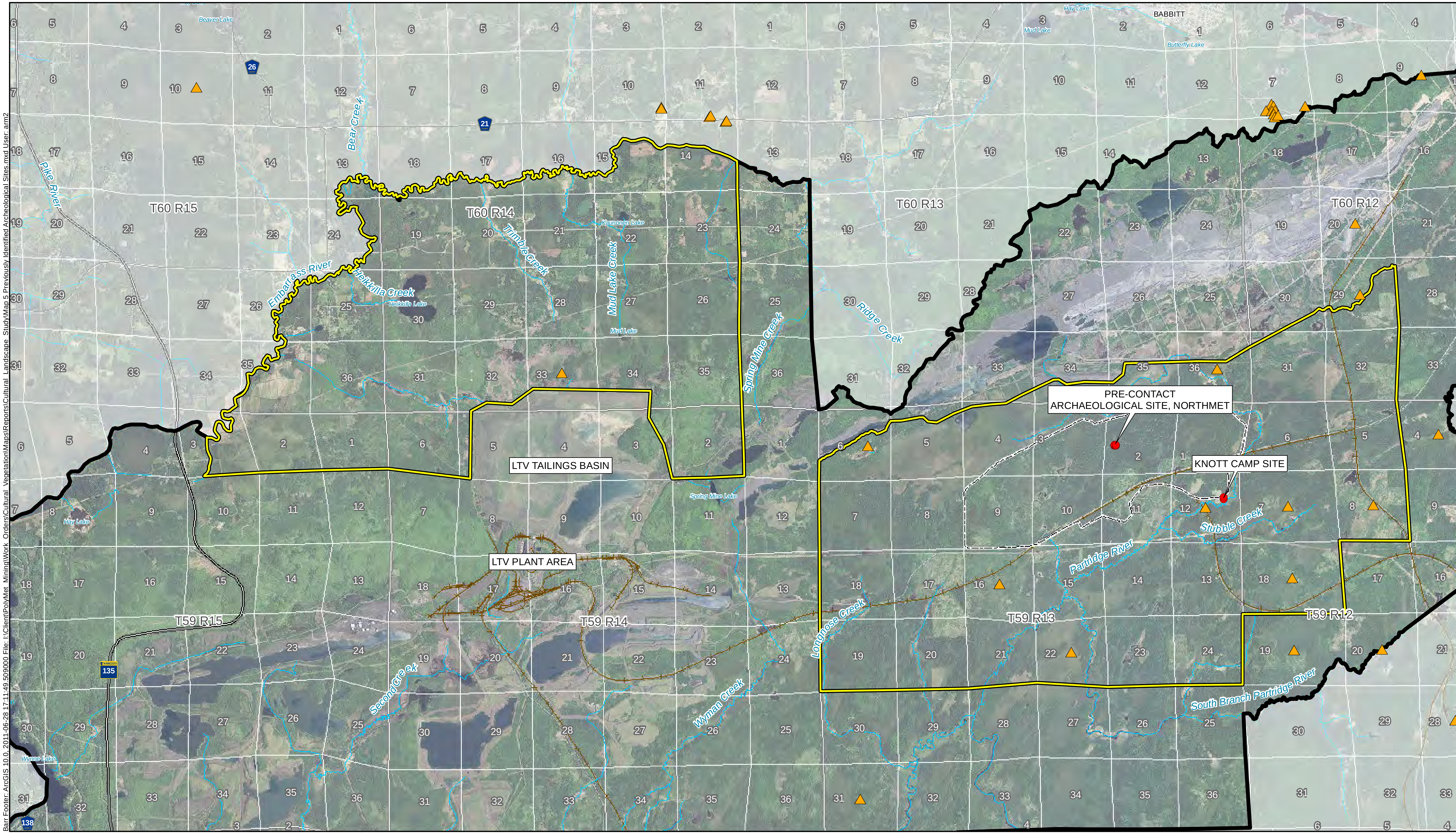
TAILINGS BASIN
PLANT AREA

▲ Historic Resources in SHPO Database
Initial Survey Areas
Preliminary Area of Potential Effect (APE)
Rivers & Streams

N

0 0.625 1.25 2.5
Miles

Map 4
HISTORIC RESOURCES
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN



Barr Footer: ArcGIS 10.0, 2011-06-28 17:11:49.599000 File: I:\Client\PolyMet Mining\Work Orders\Cultural Vegetation\Maps\Reports\Cultural Landscape Study\Map 5 Previously Identified Archaeological Sites.mxd User: arm2

- Archaeological Sites Evaluated 2006-2010
- Archaeological Sites in SHPO Database
- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Railroads
- Rivers & Streams

N

0 0.625 1.25 2.5

Miles

Map 5
PREVIOUSLY IDENTIFIED
ARCHAEOLOGICAL SITES
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Barr Footer: ArcGIS 10.0, 2011-06-15 14:53:34.395000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_Study\Map 6 Area One Eggers and Reed Wetland Types.mxd User: arm2

Spring Mine Creek
Ridge Creek
Dunka River
One Hundred Mile Swamp
Yelp Creek
Partridge River
Stubble Creek
Dunka Road
Longnose Creek
Wedges Creek
Partridge River
Wyman Creek
South Branch Partridge River

Imagery Source: FSA, 2010.

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams
- Dunka Road

Eggers & Reed Wetland Types

- Shrub Swamps (Alder thickets & Shrub-carrs)
- Coniferous bog
- Coniferous swamp
- Deep marsh; Shallow marsh
- Hardwood swamp
- Open water (Shallow, open water & lakes)
- Open bog
- Sedge meadow; Wet meadow

N

0 1,750 3,500 7,000

Feet

Map 6
SURVEY AREA ONE -
EGGERS & REED WETLAND TYPES
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

Barr Footer: ArcGIS 10.0, 2011-06-24 12:01:35.169000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_Study\Map 7 Area Two Eggers and Reed Wetland Types.mxd User: arm2

Embarrass River

Trimble Creek

Spring Mine Creek

LTV Tailings Basin

Imagery Source: FSA, 2010.

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams

Eggers & Reed Wetland Types

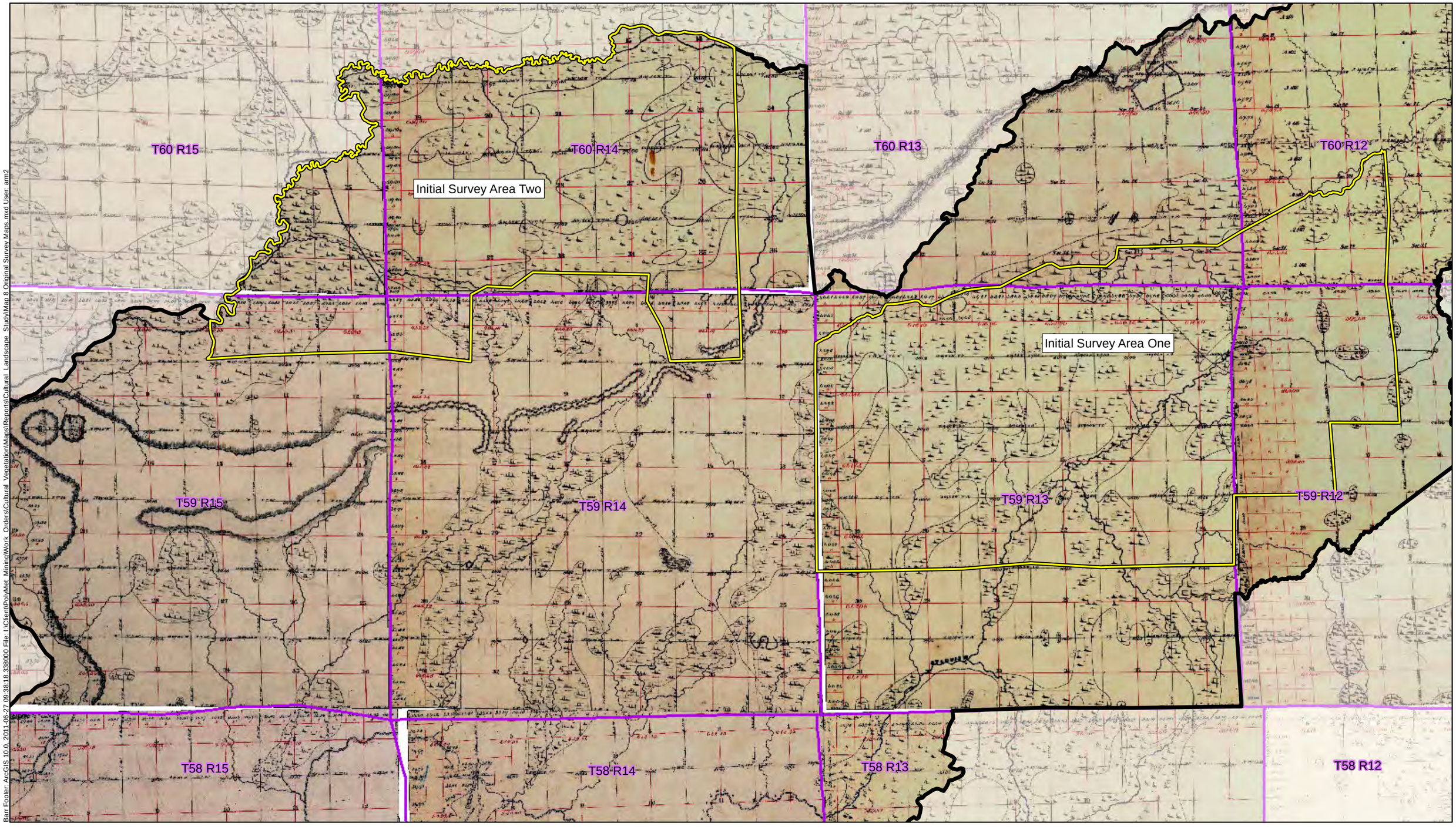
- Shrub Swamps (Alder thickets & Shrub-carrs)
- Coniferous bog
- Coniferous swamp
- Deep marsh; Shallow marsh
- Hardwood swamp
- Open water (Shallow, open water & lakes)
- Open bog
- Sedge meadow; Wet meadow

N

0 1,500 3,000 6,000

Feet

Map 7
SURVEY AREA TWO -
EGGERS & REED WETLAND TYPES
NorthMet Project
PolyMet Mining Inc.
Hoyt Lakes, Minnesota



Barr Footer: ArcGIS 10.0, 2011-06-27 09:38:19.338000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_StudyMap 8 Original Survey Maps.mxd User: arm2

Initial Survey Areas
Preliminary Area of Potential Effect (APE)
Township Boundaries

N

0 0.625 1.25 2.5
Miles

Map 8
GOVERNMENT LAND OFFICE
TOWNSHIP MAPS (1872--1882)
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

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Initial Survey Area Two

Initial Survey Area One

Initial Survey Areas

Preliminary Area of Potential Effect (APE)

Source: J. WM. Trygg, 1858-1907.
Sheet 17 of the Minnesota Series.
Used with permission.

N

0 0.625 1.25 2.5

Miles

Map 9
PRELIMINARY APE ON TRYGG MAP
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Border Lakes

Nashwauk Uplands

Giant's Range

Dunka River

Tailings Basin

Giant's Range (Embarrass Mtns.)

Partridge River

Laurentian Uplands

Tamarack Lowlands

St. Louis River

Toimi Uplands

Ecological Subsections
- Border Lakes
- Laurentian Uplands
- Nashwauk Uplands
- Tamarack Lowlands
- Toimi Uplands

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Tailings Basin
- Major Rivers

N

0 1.25 2.5 5

Miles

Map 10
ECOLOGICAL SUBSECTIONS
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Barr Footer: ArcGIS 10.0, 2011-06-27 11:34:38.932000 File: J:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_StudyMap 10 Ecological Subsections.mxd User: arn2

Archean Terrain

Embarrass River

Giant's Range

Dunka River Outlet

Dunka River

Tailings Basin

One Hundred Mile Swamp

Embarrass Gap

Giant's Range (Embarrass Mtns.)

Duluth Complex

Partridge River

Biwabik Iron Formation

Embarrass River

Partridge River

Partridge River

Virginia Formation

Dunka River

Dunka River

Bedrock Geology

- Duluth Complex
- Volcanics
- Virginia Formation
- Biwabik Iron Formation

- Archean Terrain and associated rocks
- Late Archean mafic metavolcanics
- Late Archean metasedimentary rock
- Late Archean mixed metavolcanics
- Faults

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Wetlands
- Major Rivers

N

0 0.75 1.5 3

Miles

Map 11
BEDROCK GEOLOGY
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Barr Footer: ArcGIS 10.0, 2011-06-27 11:46:21.527000 File: I:\Client\PolyMet Mining\Work Orders\Cultural Vegetation\Maps\Reports\Cultural Landscape Study\Map 11 Bedrock Geology.mxd User: arm2

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Wahlsten Moraine
Big Rice Moraine
Dunka River Outlet
Vermilion Moraine
General Rainy Lobe Ice Direction
Glacial Lake Norwood
Glacial Lake Dunka
Glacial Lake Upham
Giant's Range
Tailings Basin
Giant's Range Embarrass Mtns.
Embarrass Gap
Wampus Lake Moraine
Allen Moraine

RVG RVE RO HP M RNG DCE DLA DCG RSG

Data source: Surficial Geology: Minnesota Geological Survey, Quaternary Geology, Map S-1, 1982

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Approximate Extent of Glacial Lakes

Quaternary Geology

- DCE- End Moraine (Des Moines Lobe--Culver Moraine)
- DCG- Ground Moraine (Des Moines Lobe--Culver Moraine)
- DLA- Sand and Gravel (Glacial Lake Sediment--Undivided as to Moraine)
- HP - Peat (Holocene)
- M - Mine Pits and Dumps (Holocene)
- RNG- Ground Moraine (Rainy Lobe--Nashwauk Moraine)
- RO - Outwash-Undivided as to Moraine Association
- RSG- Ground Moraine (Rainy Lobe--St. Croix Moraine)
- RVE- End Moraine (Rainy Lobe--Vermillion Moraine)
- RVG- Ground Moraine (Rainy Lobe--Vermillion Moraine)
- Moraines

N

0 1.125 2.25 4.5
Miles

Map 12
SURFICIAL GEOLOGY
Cultural Landscape Study
NorthMet Project, Polymet Mining, Inc.
Hoyt Lakes, St. Louis County, MN

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T60 R15 T60 R14 T60 R13 T60 R12

T59 R15 T59 R14 T59 R13 T59 R12

T58 R15 T58 R14 T58 R13 T58 R12

Survey Area Two

Survey Area One

Initial Survey Areas

Preliminary Area of Potential Effect (APE)

Presettlement Vegetation*

Aspen-Birch (trending to Conifers)

Conifer Bogs and Swamps

Jack Pine Barrens and Openings

Lakes (open water)

Mixed Hardwood and Pine (Maple, White Pine, Basswood, etc)

Mixed White Pine and Red Pine

*Source: Marschner's original analysis of Public Land Survey notes and landscape patterns.

N

0 0.625 1.25 2.5

Miles

Map 13
MARSCHNER'S PRE-SETTLEMENT VEGETATION
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Northshore Mine

One Hundred Mile Swamp

Spring Mine Creek

Ridge Creek

Yelp Creek

Partridge River

Stubble Creek

Dunka River

Dunka Road

Longnose Creek

Wetlegs Creek

Wyman Creek

South Branch Partridge River

Imagery Source: FSA, 2010.

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams
- Dunka Road

Vegetation

- Alder thicket
- Aquatic
- Aspen/Birch forest
- Boreal forest
- Disturbed
- Logged
- Northern wet forest
- Sedge meadow
- Sphagnum bog

N

0 1,750 3,500 7,000

Feet

Map 14
SURVEY AREA ONE - VEGETATION
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

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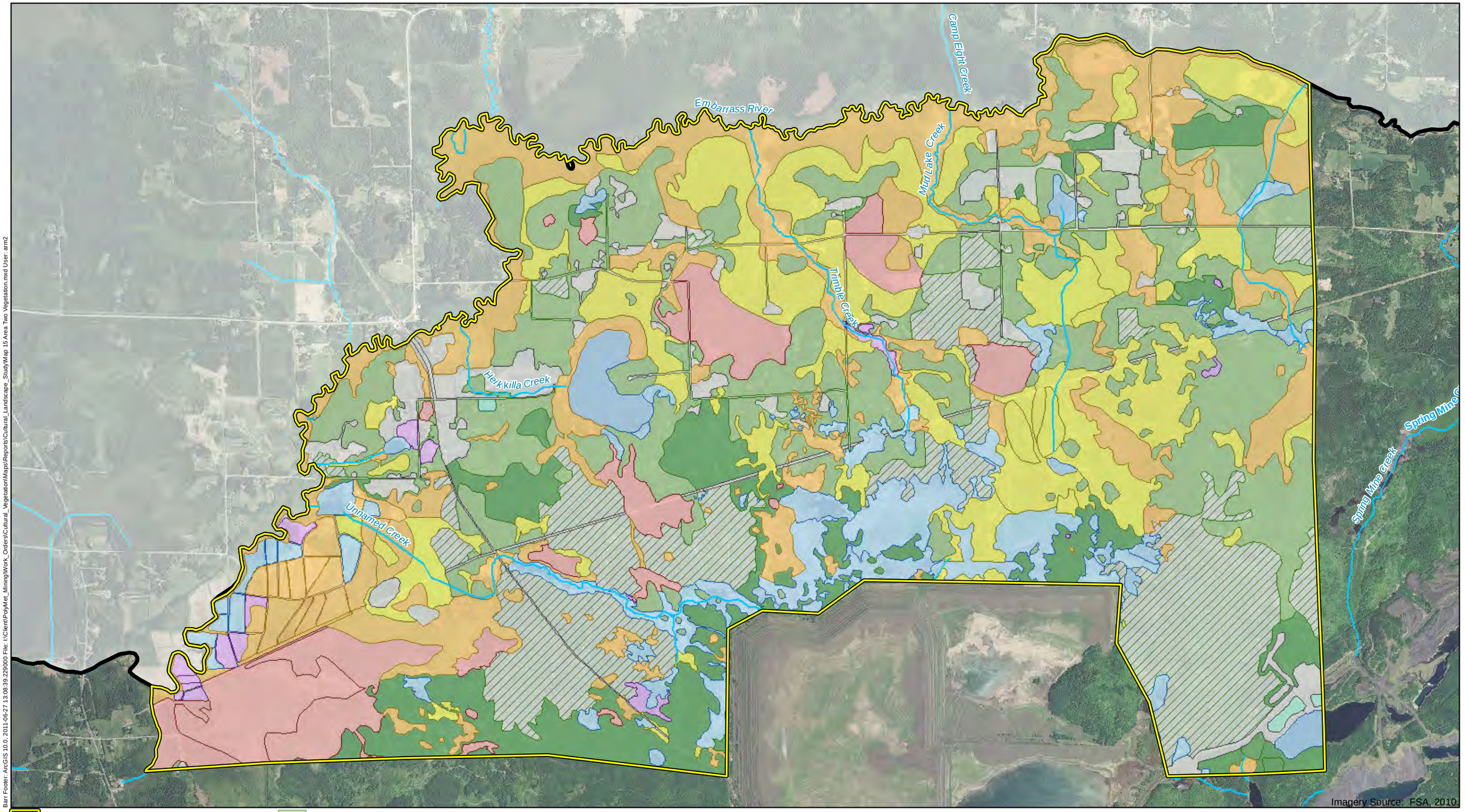

- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams

Vegetation

- Alder thicket
- Aquatic
- Aspen/Birch forest
- Boreal forest
- Disturbed
- Logged
- Northern wet forest
- Pine Forest
- Sedge meadow
- Sphagnum bog

N

0 1,500 3,000 6,000

Feet

Map 15
SURVEY AREA TWO - VEGETATION
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

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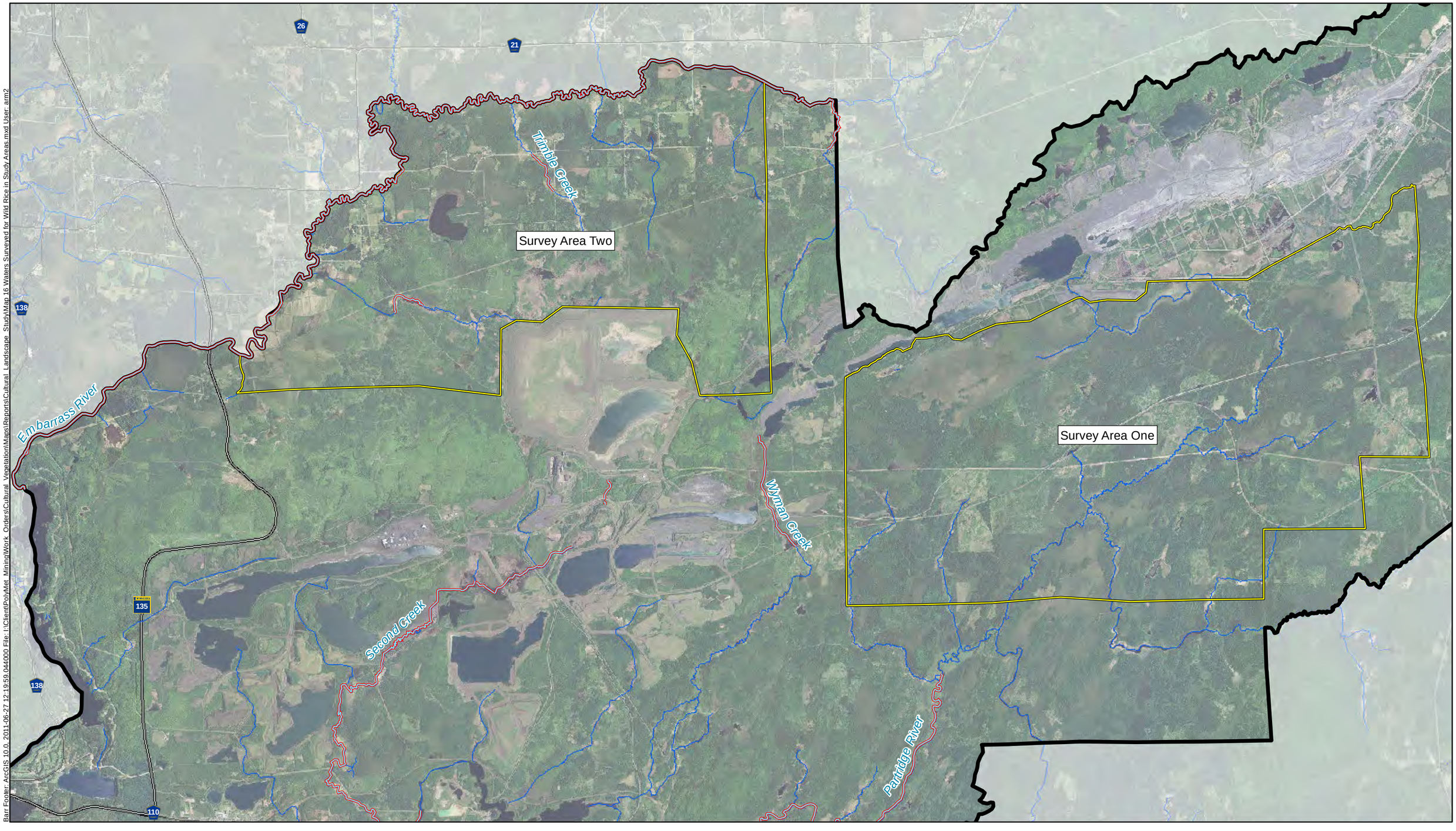


- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Shorelines Surveyed for Wild Rice
- Stream Segments Surveyed for Wild Rice

N

0 1.25 2.5

Miles

Map 16
WATERS SURVEYED FOR WILD RICE
IN STUDY AREAS ONE AND TWO
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

Barr Footer: ArcGIS 10.0, 2011-06-27 13:56:57.723000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_Study\Map 17 Area One Plant & Wild Rice Surveys.mxd User: arm2

Ridge Creek
Spring Mine Creek
Northshore Mine
Partridge River
One Hundred Mile Swamp
Yelp Creek
Unnamed Creek
Stubble Creek
Dunka Road
Partridge River
Wyman Creek
Longnose Creek
Wetlegs Creek
Wyman Creek
South Branch Partridge River

Imagery Source: FSA, 2010.

- Vegetation Survey Points - Barr
- Vegetation Survey Points - Deb Pomroy
- Indian Trails from Trygg Map
- Stream Segments Surveyed for Wild Rice
- Shorelines Surveyed for Wild Rice
- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams

N

0 1,750 3,500 7,000
Feet

Map 17
SURVEY AREA ONE -
PLANT AND WILD RICE SURVEYS
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota

Barr Footer: ArcGIS 10.0, 2011-06-27 14:07:55.538000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Vegetation\Maps\Reports\Cultural_Landscape_Study\Map 18 Area Two Plant & Wild Rice Surveys.mxd User: arm2

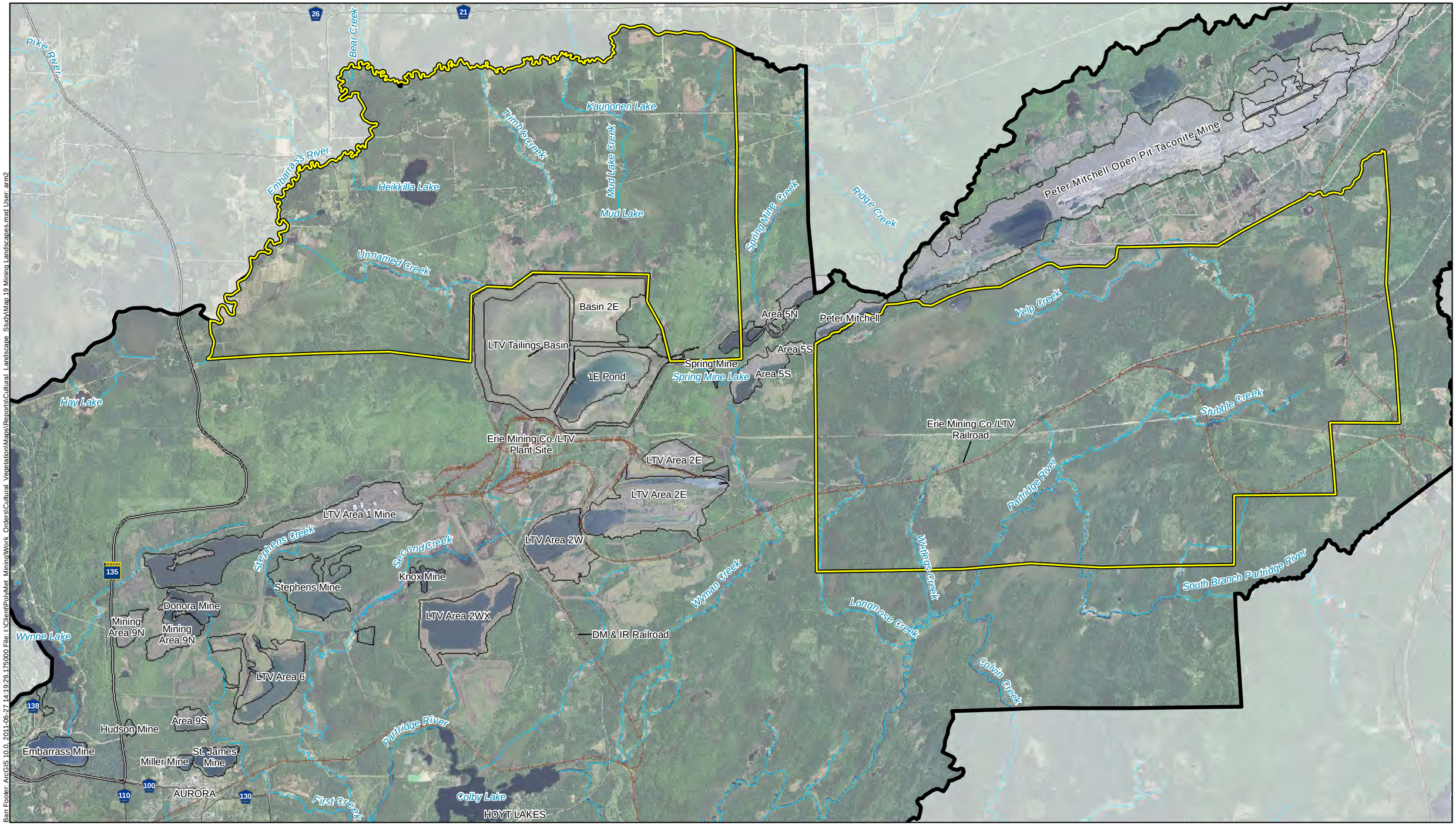
Camp Eight Creek
Mud Lake Creek
Trimble Creek
Embarrass River
Embarrass River
Hekkila Creek
Unnamed Creek
Unnamed Creek
Ridge Creek
Spring Mine Creek
Overlook
Spring Mine Creek
Sugar Bush Site
Imagery Source: FSA, 2010.

- Vegetation Survey Points - Barr
- Vegetation Survey Points - Deb Pomroy
- Indian Trails from Trygg Map
- Stream Segments Surveyed for Wild Rice
- Shorelines Surveyed for Wild Rice
- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- Rivers & Streams

N

0 1,750 3,500 7,000
Feet

Map 18
SURVEY AREA TWO -
PLANT AND WILD RICE SURVEYS
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, Minnesota



Initial Survey Areas
Preliminary Area of Potential Effect (APE)
Mining Features - DNR, 2009.
Railroads
Rivers & Streams

N

0 0.625 1.25 2.5
Miles

Map 19
NATURAL ORE TACONITE MINES
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN

Barr Footer: ArcGIS 10.0, 2011-06-27 14:19:29.175000 File: I:\Client\PolyMet_Mining\Work_Orders\Cultural_Landscape_Study\Maps\Reports\Cultural_Landscape_StudyMap_19 Mining Landscapes.mxd User: arm2

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Pike River
Bear Creek
Embarrass River
Trimble Creek
Kaunonen Lake
Mud Lake Creek
Heikkila Lake
Laurentian Divide
Mud Lake
Spring Mine Creek
Ridge Creek
Yelp Creek
Stubble Creek
Partridge River
Wetlegs Creek
Longnose Creek
Colvin Creek
South Branch Partridge River
Wyman Creek
Spring Mine Lake
Hay Lake
Wynne Lake
Stephens Creek
Second Creek
First Creek
Colby Lake
AURORA
HOYT LAKES

Indian Trail Intersection Site
Overlook Site
Sugar Bush Site

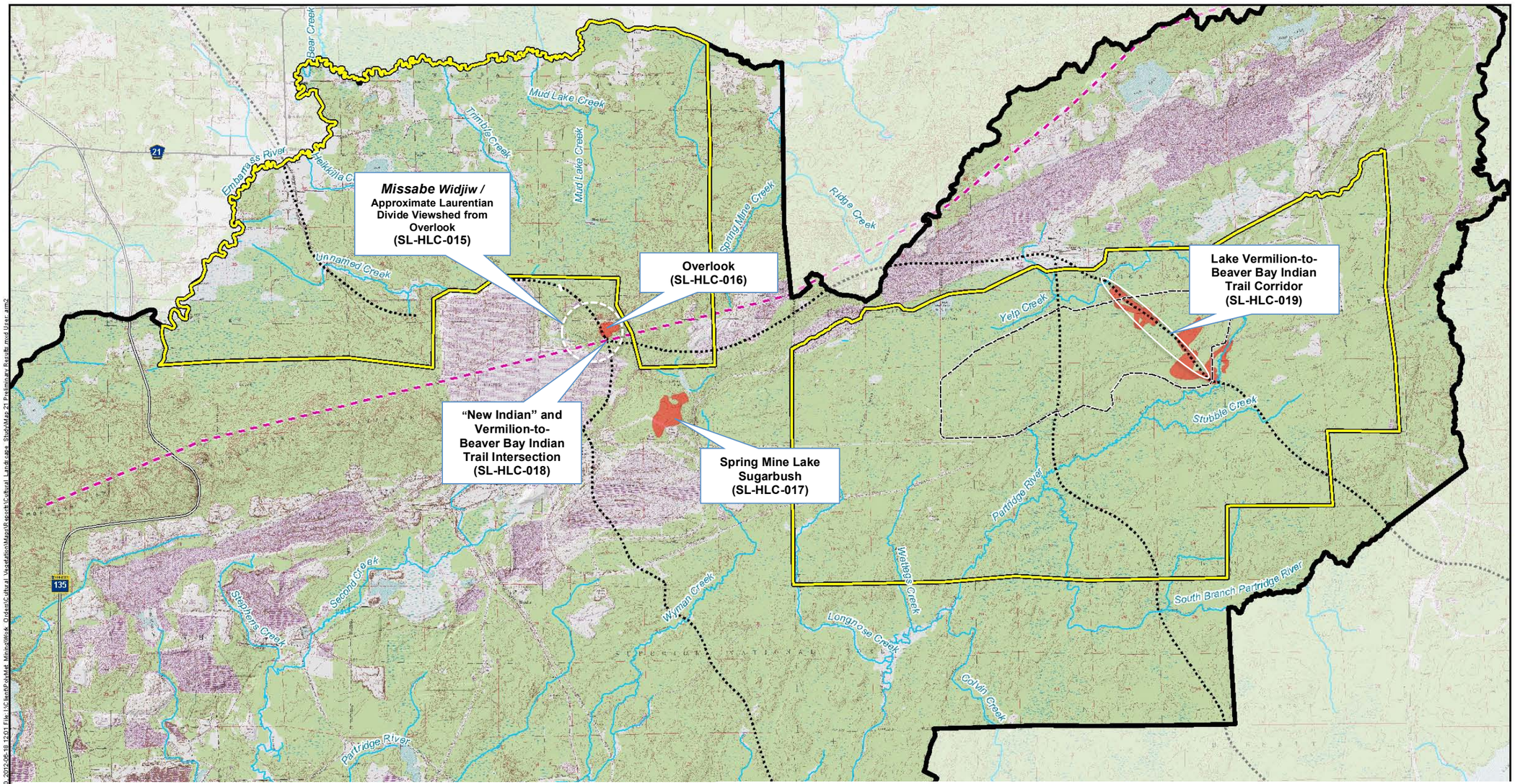
7-01 7-02 7-03 7-04 7-05 7-06 7-07 7-08 7-09
6-01 6-02 6-03 6-04 6-05
10-1 10-2 10-3 10-4 10-5 10-6
5-01 5-02 5-03 5-04 5-05 5-06 5-07 5-09
8-01 8-02 8-03 8-04
DP-05-01 DP-05-02 DP-05-03 DP-05-04 DP-05-05 DP-05-06 DP-05-07 DP-05-08 DP-05-09
DP-08-01 DP-08-02 DP-08-03 DP-08-04 DP-08-05 DP-08-06 DP-08-07 DP-08-08 DP-08-09 DP-08-10 DP-08-11 DP-08-12 DP-08-13 DP-08-14

- Vegetation Identified by Barr Engineering
- Vegetation Identified by Deb Pomroy
- Outcrops
- Indian Trails from Trygg Map
- Rivers & Streams
- Initial Survey Areas
- Preliminary Area of Potential Effect (APE)
- SITE Recommended NRHP Eligible

N

0 0.625 1.25 2.5
Miles

Map 20
PRELIMINARY RESULTS
Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN



Initial Survey Areas

Preliminary Area of Potential Effect

Areas Surveyed by Corps in 2010

Approximate viewshed boundary of *Missabe Widjiw*

Indian Trails from Trygg Map (1966)

Rivers and Streams

N

Recommended Potentially NRHP Eligible SLC-HLC- ###

Map 21

RESULTS

Properties of Spiritual and Cultural Significance Identified by Minnesota Ojibwe Bands: Recommended *Missabe Widjiw* Area NRHP Multiple Property Listing

Cultural Landscape Study
NorthMet Project, PolyMet Mining Inc.
Hoyt Lakes, St. Louis County, MN
9/01/2012