NATIONAL PARK SERVICE

NATIONAL HISTORIC LANDMARK PROGRAMS

WARNING

THIS FILE CONTAINS INFORMATION THAT IS RESTRICTED FROM PUBLIC ACCESS PURSUANT TO THE PROVISIONS OF 54 U.S.C. 307107 (formerly Section 304 of the National Historic Preservation Act of 1966, as amended).

THIS DOCUMENTATION OR AND PROVISIONS THEREOF MAY BE VIEWED OR REPRODUCED ONLY WITH THE PERMISSION OF THE SECRETARY OF THE INTERIOR ACTING THROUGH THE KEEPER OF THE NATIONAL REGISTER OR HIS/HER AUTHORIZED DESIGNEE.

FILE (PROPERTY) Name: MINONG COPPER MINING DISTRICT

Location – State: MICHIGAN

Location – County/Parish: KEWEENAW COUNTY

1. NAME AND LOCATION OF PROPERTY

Historic Name: Minong Copper Mining District

Other Name/Site Number: Minong, Minong Mining Company, Cove. McCargoe Cove, McCargoe's Cove / 20IR24, 20IR73

Street and Number (if applicable)**:** N/A

City/Town: N/A **County:** Keweenaw **State:** MI

2. SIGNIFICANCE DATA

NHL Criteria: 1, 6

NHL Criteria Exceptions: N/A

NHL Theme(s):

I. Peopling Places
V. Developing the American Economy
VI. Expanding Science and Technology
VII. Transforming the Environment

Period(s) of Significance: ca. 4,500 BCE – ca. 1890 CE; ca. 1841-1900

Significant Person(s) (only Criterion 2)**:** **N/A**

Cultural Affiliation (only Criterion 6)**:** Archaic, Woodland, Historic

Designer/Creator/Architect/Builder: N/A

Paperwork Reduction Act Statement. We are collecting this information under the authority of the Historic Sites Act of 1935 (16 U.S.C. 461-467) and 36 CFR part 65. Your response is required to obtain or retain a benefit. We will use the information you provide to evaluate properties nominated as National Historic Landmarks. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has approved this collection of information and assigned Control No. 1024-0276.

Estimated Burden Statement. Public reporting burden is 2 hours for an initial inquiry letter and 344 hours for NPS Form 10-934 (per response), including the time it takes to read, gather and maintain data, review instructions and complete the letter/form. Direct comments regarding this burden estimate, or any aspects of this form, to the Information Collection Clearance Officer, National Park Service, 12201 Sunrise Valley Drive, Mail Stop 242, Reston, VA 20192. Please do not send your form to this address.

Historic Contexts:

I. Cultural Developments: Indigenous American Populations
- A. The Earliest Inhabitants
  - 1. The Early Peopling of North America
- C. Prehistoric Archeology: Topical Facets
  - 4. Prehistoric Technology
  - 22. Major Contributions to the Development of the Science of Archeology

XVIII. Technology (Engineering and Invention)
- F. Extraction and Conversion of Industrial Raw Materials

3. WITHHOLDING SENSITIVE INFORMATION

Does this nomination contain sensitive information that should be withheld under Section 304 of the National Historic Preservation Act?

_X_Yes

___ No

4. GEOGRAPHICAL DATA

1. Acreage of Property: 211.5

2. Use either Latitude/Longitude Coordinates or the UTM system:

Latitude/Longitude Coordinates:
Datum if other than WGS84: NAD 83
(enter coordinates to 6 decimal places)

Latitude: **Longitude:**

OR

UTM References:	**Zone**	**Easting**	**Northing**
[redacted]	[redacted]	[redacted]	[redacted]

3. Verbal Boundary Description:

[redacted]

4. Boundary Justification:

[redacted]

5. SIGNIFICANCE STATEMENT AND DISCUSSION

INTRODUCTION: SUMMARY STATEMENT OF SIGNIFICANCE

The Minong Copper Mining District is nationally significant because of the ways in which it showcases the intimate connection between North America's most significant precontact and historic native copper mining activities. The site combines one of the largest, best preserved precontact copper mining landscapes with the well-preserved remains of the largest historic copper mining operation on Isle Royale. Precontact copper mining in the Lake Superior basin is one of the oldest examples of human metals exploitation on earth, and native copper obtained from the mines in the region formed the basis of a copper tool and ornament making tradition beginning as early as the Paleoindian period and extending through the seventeenth century. This copper was also traded widely across Eastern North America.

The precontact copper mining pit concentration (20IR24) within the Minong Copper Mining District is one of the largest ever found, and is by far the most thoroughly studied. Beginning in the 1840s, American miners used precontact mining remains found on Isle Royale and Michigan's Keweenaw Peninsula as a key guide to establishing a native copper mining industry that by 1870 was producing the majority of the world's copper. The region remained globally significant as a source of copper for over a century, supported by the unique geology underlying the Keweenaw Peninsula and Isle Royale. Of the mining operations established on Isle Royale, the Minong Mining Company (1874-1883) was the largest and most productive. The company emphasized the size of the precontact pit concentration as evidence of vast subterranean mineral wealth, and the operation yielded nearly half a million pounds of copper during its period of operation. Early discoveries of precontact mining evidence by prospectors attracted the interest of nineteenth-century scientific observers, such as Charles Whittlesey and William Henry Holmes, who soon arrived in the region themselves to conduct early surveys and excavations of precontact mining landscapes. The Minong Copper Mining District figured prominently in a number of early archeological investigations, contributing to the development of archeological science with respect to understandings of precontact copper mining. Much of our modern archeological knowledge of precontact native copper mining methods stems from field research undertaken at 20IR24. Finally, the Minong Copper Mining District is located within Isle Royale National Park, a unit of the National Park Service, and enjoys the protection of both National Park and Wilderness status, ensuring that it will retain its high level of integrity indefinitely.

The Minong Copper Mining District meets Criterion 1 for a National Historic Landmark nomination under three thematic frameworks: *Developing the American Economy*, *Expanding Science and Technology*, and *Transforming the Environment*. The site also meets Criterion 6 under two thematic frameworks: *Peopling Places* and *Expanding Science and Technology*. The Minong Copper Mining District is an exceptional example of Isle Royale's contribution to regional copper mining traditions that attained national and eventually global significance and incorporates both precontact and historic phases. Under Criterion 1, the global impact of the region's native copper industry during the period the Minong Mining Company was in active operation speaks to the theme *Developing the American Economy* under the topics of extraction and production, distribution and consumption, transportation and communication, and workers and work culture. Under the theme of *Expanding Science and Technology*, continuous archeological interest in the precontact landscape of the Minong Copper Mining District over a century and a half helped support significant advances in the science of precontact archeology. Some 9,000 years of precontact and historic copper mining activity have left an indelible mark on the landscape of the Minong Copper Mining District, and fall under the theme *Transforming the Environment*. Under Criterion 6, *Peopling Places* is represented by the evidence of precontact patterns of migration to and

from Isle Royale. Finally, the theme *Expanding Science and Technology* is strongly reflected in the extraordinary wealth of data the Minong Copper Mining District has yielded and holds the potential to yield concerning understandings of precontact native copper mining technology.

PROVIDE RELEVANT PROPERTY-SPECIFIC HISTORY, HISTORICAL CONTEXT, AND THEMES. JUSTIFY CRITERIA, EXCEPTIONS, AND PERIODS OF SIGNIFICANCE LISTED IN SECTION 2.

Cultural and Temporal Contexts

The temporal periods best represented at Minong Mine are the Archaic period, the Woodland period, and the era of historic mining exploration and extraction at the site ca. 1841-1900. Archeological and historical evidence suggests periodic and occasionally intense copper exploitation activity by native groups stretching from about 4,500 BCE through the 1880s. Both precontact and historic mining remains in the Minong Copper Mining District are mingled in a way that serves as an outstanding example of the broader human history of copper mining in the Lake Superior Basin; the globally significant copper mining industry that developed here in the nineteenth century continued and expanded upon a history of human metals exploitation extending back nearly ten thousand years.

Archaic (9000 BCE-1000 BCE)

In the eastern United States, the Archaic period is subdivided into Early, Middle, and Late sub-stages and a wide variety of regionally specific cultural traditions. Various authorities differ on the Archaic's precise initial and terminal dates in eastern North America (cf. Anderson 2015:103; Sassaman 2015:21), but this nomination uses the dates 9000 BCE-1000 BCE for the period as it occurs in the region. Generally, the period can be characterized by a shift away from the hunting of large migratory herbivores brought about by long-term warming trends. This led to the exploitation of more local food sources including small mammals, fish, and local plants (Kuehn 1998). Shifts towards local resources included more local procurement strategies for lithics and the increased use of copper for both tools and ornaments, to say nothing of its use as a commodity of trade. The Archaic period is also distinguished by a growing sophistication in tool manufacture and use, and is reflected in a widening variety of lithic and copper tool styles (Mason 1981; Brown 1983). Small chert scrapers became more common. The average size of projectile points and knives shrank substantially compared with their Paleoindian period counterparts, and a new hafting technology involving notched sides appeared, with corner notches appearing during the Late Archaic (Clark 1995). The proliferation of local and regional cultural traditions during this period also seems to have been accompanied by a growing network of exchange of goods and information over wide areas. In the Upper Great Lakes, the Archaic period, and especially the Early and Middle sub-stages, remains a relatively poorly documented time period, due to the fragmentary nature of the evidence so far collected.

The first evidence of copper exploitation on Isle Royale dates to the Middle/Late Archaic. Radiocarbon dates collected by Griffin and Bastian in several excavated pits on Minong Ridge yielded dates ranging from 3,000 ± 350 YBP to 4420 ± 150 YBP (Griffin 1961; Bastian 1963a; Martin 1999). Pompeani et al. [redacted] recorded metal pollution exceeding background levels between 6500 YBP-5400 YBP, and again after 1860, during the period of historical mineral exploration on Isle Royale (Pompeani et al. 2015).

Evidence of Archaic occupation on Isle Royale is found island-wide, but in smaller quantities than more recent (i.e., Woodland period) precontact occupations. The relative paucity of Archaic sites is due more

to limited archeological study than anything else. Prior to 2012, most of the island's archeological inventory work focused on modern shorelines that correlate to Woodland use. [redacted] (DePasqual and Pomber 2012, Stroh 2014; Campetti et al 2015; Olson and DePasqual 2016). Following initial discovery, excavation work was performed at three of these sites, [redacted] The latter is of particular interest as it concerns two occupation sites potentially associated with Minong mining activities. Each site yielded data suggestive of copper tool manufacturing where all stages of production are represented in the material assemblage (Olson and DePasqual 2016). [redacted]

The two Archaic cultural traditions most relevant to the Upper Great Lakes and Isle Royale are the Shield Archaic and Old Copper Complex. Both traditions are so broad in terms of their geographical scope, and inclusive with respect to artifact styles, that debate continues as to their true utility in defining distinct cultural traditions (Clark, 1999; Martin, 1999). Groups belonging to the Shield Archaic tradition occupied a portion of the Canadian Shield extending from the southern part of the Northwest Territories east to Nova Scotia. The Shield Archaic material culture assemblage is poorly defined, apart from being characterized by the use of local materials. In particular, Shield Archaic sites are virtually impossible to distinguish from Woodland Laurel tradition sites if Laurel ceramics are not present. While the Shield Archaic does not extend to the mainland south of Isle Royale (such as the Keweenaw Peninsula), Archaic visitation of the island has been associated with this tradition (Clark 1995; Hill 2006).

The Old Copper Complex (OCC), sometimes referred to as the Old Copper Culture, is even more problematic from a classificatory standpoint. Though considered an antiquated approach by most archeologists, the OCC represented an early and long-lived attempt to make sense of a flourishing period of copper exploitation in the Middle to Late Archaic, and is thus relevant to any discussions of copper mining in the Archaic period. The OCC is roughly defined by an extensive set of copper artifacts found over a wide area between the Middle to Late Archaic, or approximately 3000-1200 BCE (Stoltman 1986; Clark and Martin 2005; Pleger and Stoltman 2009). Common copper artifact forms from the OCC include large spearheads and knives, harpoons, gaffs, adzes, awls, and beads (Clark and Martin 2005). Eastern or northeastern Wisconsin appears to be the OCC's core region with the densest concentration of sites attributed to the OCC (the Oconto Site NHL, located within Copper Culture State Park, is one such locality in Wisconsin). However, artifacts identified with the OCC have also been found far to the south and west of this core, in such places as Cahokia in Illinois and Moundville in Alabama, as well as to the east as far as eastern Ontario (Clark 1999).

OCC artifacts have been identified in Archaic contexts, but also occasionally in Woodland and Ohio Hopewell contexts. This distribution, along with the similarities in form between some OCC artifact types and similar types dating to the Woodland period, complicate attempts to define OCC cultural traditions with greater specificity (Martin 1999). Martin highlights two competing views, with the OCC being defined as either an opportunistic use of copper in areas where good lithic sources were lacking, or as a form of mortuary tradition; as Martin points out, "Clearly, these two views were not mutually exclusive. It is perfectly reasonable to suggest that copper played technical, social, and ideological roles

in highly variable ways throughout prehistory…" (Martin 1999:161).

Despite the uncertainty surrounding the OCC as a distinct cultural tradition, the copper artifacts associated with the OCC collectively represent the most intensive exploitation of copper for tool and ornament making until the appearance of later Woodland and Hopewell traditions. Sites linked to the OCC have been found on the Keweenaw Peninsula and the southwest shore of Lake Superior, but not as yet on the island itself (Clark 1995; Stroh 2014), though copper mining activity at Minong Ridge temporally overlaps the OCC period and potentially served as a raw material source for OCC copper artifact production (Levine 2007b).

Woodland Period (1000 BCE-ca.1620s CE)

The Woodland period is distinguished by the development of pottery, and like the Archaic period is subdivided into temporal (Initial and Terminal) sub-stages, as well as into regionally specific cultural traditions. In the Lake Superior basin, the Initial Woodland stage is also referred to as the Laurel stage, after the region's first ceramic tradition. Copper technology shifted only slightly from Archaic traditions, with the largest copper artifacts found in Archaic assemblages being absent from Woodland assemblages, though the smaller classes of copper artifacts continued to be produced in much the same way (Martin 1999; Clark 1999). Thus, unless organic samples for absolute dating can be obtained, Initial Woodland sites in the Lake Superior region are differentiated from Shield Archaic or other Archaic cultures almost exclusively based on the presence or absence of Laurel pottery.

The Terminal Woodland period in the Lake Superior basin began ca. 600-700 BCE. This period is defined by the increasing proliferation of various regional cultural traditions, reflecting a growing local specialization in resource exploitation. Terminal Woodland cultures identified in the Lake Superior region include the Blackduck, Selkirk, Sandy Lake/Wanikan, Peninsular Woodland, Juntunen, and Huron cultures (Clark 1999). Some archeologists have worked to develop specific cultural affiliations between these groups and historical native groups such as the Ojibwa, Cree, Iroquois, Ottawa, Huron, and others, though this remains tentative. Terminal Woodland sites rich in copper artifacts, such as the Juntunen site demonstrate that Woodland period native copper-working processes—primarily hammering and annealing—remained essentially unchanged from earlier periods.

Seven Woodland period copper mining sites have been documented on Isle Royale, along with numerous occupation sites (Clark 1995). [redacted] Only a handful of the approximately 1,500-2,000 mining pits at [redacted] have been archeologically investigated, leaving open the possibility that at least some were mined during the Woodland period. Native copper exploitation continued though the Terminal Woodland period, declining rapidly after the Contact period in the early seventeenth century due to the availability of European-sourced sheet copper and finished metal goods (Halsey 1992; Fox et al. 1995). Nevertheless, indigenous knowledge of copper exploitation and its role in traditional culture never died out. Native groups such as the Ojibwe retained knowledge of local native copper sources such as Minong Ridge through the historic period, and they remain part of the region's oral traditions (Krause, 1992; Cochrane 2009). Thus, Native American copper use in the Lake Superior basin represents an uninterrupted 9,000-year tradition of metals exploitation, one of the oldest on earth.

Precontact Copper Exploitation in the Lake Superior Basin

Native copper, a naturally occurring yet chemically pure form of copper, was likely the first metal to be worked by humans (Craddock 1995). Being nearly pure copper, native copper does not require smelting in order to be fashioned into useful copper tools and ornaments; simple hammering and perhaps annealing are sufficient (Krause 1992; Martin 1999).

North American, precontact hammered copper presents a quite varied assemblage including awls, knives, celts, hooks, beads, and bracelets (For the most commonly used typology, see Wittry 1957). Hammered native copper artifacts began to appear during the seventh millennium BCE in Turkey; smelting activity seems to have begun a thousand years later (Hunt et al. 2006; Garfinkel et al. 2014; see also Maddin et al., 1991; Hauptmann et al., 1993; Esin, 1999). While native copper is not particularly rare, and sources have been documented over a wide area within the United States (Halsey 1992; Levine 1999; Levine 2007a; Blake 2004; Cooper et al. 2008), the Lake Superior basin is well known for containing the largest deposits of native copper found on earth (Krause 1992). The earliest documented human exploitation of metals in the Americas took place in the Lake Superior basin during the Paleoindian period, as early as the seventh millennium BCE—within a few hundred years of the earliest Old World radiocarbon-dated examples (S. Martin 1999). This first settlement and copper exploitation took place a short time after the Great Lakes themselves emerged during glacial retreat and the region warmed between 9500-1200 YBP (Bastian 1963a; S. Martin 1999). The Minong Copper Mining District, located in this area, serves as an exceptional example of precontact copper mining within a region hosting some of the earliest examples of metals exploitation in human history.

Native copper exploited by precontact peoples may be found in either primary or secondary deposits. Primary or lode deposits, consisting of native copper-bearing rock, are found throughout the Lake Superior basin, but particularly on the south shore, including the Keweenaw Peninsula and Isle Royale. The Minong Mine is an outstanding example of this type of source. Secondary sources of native copper, also called “float” or “drift” copper, consist of “glacial till deposits and sorted till and outwash occurring on river bottoms and lakeshores” (Clark 1995, p. 173 ; see also Ferone 1999; Martin 1999). Such secondary sources ranged from small pieces to large masses, such as the Ontonagon Boulder, which weighs approximately 1.5 tons—and this after being worked as a source of copper for centuries (Krause 1992). While secondary copper sources yielded pieces of copper ready to be worked into tools or ornaments, primary sources had to be mined by digging pits or working surface fissures in copper-bearing rock (Bastian 1963).

As William Henry Holmes first noted in 1901, precontact copper *mining* techniques resembled lithic *quarrying* techniques in many respects (Holmes 1901). Native peoples learned to recognize geological features indicative of a primary native copper source, such as exposed fissures or veins of companion minerals. They then excavated the surrounding rock to expose the vein and remove the copper. Precontact miners’ primary means of extracting copper from the pits and fissures was the use of hammerstones used to break up rock surrounding the mineral veins and expose sheet or mass copper; hammerstones form the bulk of the artifact assemblage recovered from excavated mining pits or observed during survey (Davis 1875; Holmes 1901; Griffin 1961; Bastian 1963a; Martin 1999; Trepal 2015; DePasqual 2016). Martin (1999) synthesized previous archeological data on precontact copper mining in the Lake Superior basin and developed a three-stage reconstruction of the precontact mining process. This involved an initial stage of hammering with large, heavy hammerstones (perhaps suspended by thongs so they could be swung more easily) to fracture the bedrock and loosen the copper. The second stage involved using smaller, more easily handheld hammerstones to remove scale and free the copper. A final stage would have used still smaller hammerstones to remove inclusions from the collected copper (Martin 1999).

The hammerstones used in precontact copper mining were smooth, ovoid beach cobbles brought inland from the lake shore and ranging in weight from under a pound to over sixty pounds. They have been found in both grooved (for hafting) and non-grooved varieties (Martin 1999). Bastian noted that the largest hammerstones could be hard to distinguish from large rocks removed while mining, suggesting local, opportunistic sourcing for the largest stones. Isle Royale hammerstones are predominantly non-grooved whereas mainland hammerstones apparently more often feature grooves (Bastian 1963a).

While some pits elsewhere on Isle Royale have been dated to the Terminal Woodland stage, none of the radiocarbon dates obtained from pits at Minong Mine have yielded dates from the Woodland period.Evidence of Woodland period occupation also exists within the Minong Copper Mining District in the form of site 20KE73, but no evidence conclusively linking it to the nearby mining pit concentration has been recovered (Bastian 1963; Clark 1995; DePasqual 2016). Nevertheless, given the existence of other much smaller mining sites on Isle Royale dated to the Woodland period, it is clear that Woodland period visitors also exploited copper sources on the island, and continued to do so through the Historic period (Martin 1999; Cochrane 2009). Given the huge size of the pit concentration and the known cultural significance of copper to these groups, Woodland period visitors to Minong would almost certainly have been familiar with them.

Historic Period (ca. 1620s-1900)

The first European visitors to the Lake Superior basin were French explorers pushing west from Quebec in the first third of the seventeenth century. These men learned native languages and customs, and returned the first historical accounts describing the region. One of these, Étienne Brûlé, probably reached Lake Superior sometime before 1623, the first European to do so (Krause 1992). Before European visitors had even reached the lake, however, they had learned of the presence of copper from native groups and had seen samples of the copper tools and ornaments obtained from the unexplored hinterland. Brûlé himself may have traded for some of this copper with natives, though that was not the main purpose of his travels, and contemporary accounts discussed the existence of a mine in as-yet unexplored parts of the Great Lakes (Krause 1992).

Within twenty years, Jesuit missionaries joined the *voyageurs* in the region. They traveled extensively and, along with growing numbers of fur traders, left a substantial body of written records detailing their observations, including numerous references to a substantial but distant source of the natives' copper goods. In 1659, the voyageurs Radisson and Groseilliers mentioned having been told of an island, "all of copper" in Lake Superior, and that the natives periodically journeyed to a "great island far out into the lake," a clear reference to Isle Royale (Krause 1992, p. 29). Jesuit Missionary Claude Dablon investigated numerous rumors of copper sources around 1670, with the natives referring to Minong (the Ojibwe term for Isle Royale) as a particularly rich source. Dablon also personally confirmed the existence of a huge copper "ingot" that came to be known as the Ontonagon Boulder, the most famous copper mass found in the region (Krause 1992). Over the next 120 years the French, especially during the intendancy of Jean Talon (1665-1672), periodically undertook expeditions in search of economically viable sources of copper, ultimately without success (Chapais 1914; Krause 1992; Cochrane 2009). The British, who assumed ownership of French Canada in 1763, sent a party in a failed attempt to retrieve the Ontonagon Boulder in 1766, and undertook an abortive lode mining operation in the early 1770s (Lankton 1991; Krause 1992).

Serious mineral exploration and exploitation of Lake Superior's copper deposits began only with the

arrival of American geologists, surveyors, and mineral prospectors, beginning in the 1820s. Lewis Cass, the territorial governor of Michigan, and Henry Schoolcraft visited the Keweenaw Peninsula in 1820, including a visit to the Ontonagon Boulder. Influenced partly by Schoolcraft's report, the United States government subsequently gained mineral exploration rights through an 1826 treaty with the Ojibwe. Schoolcraft undertook two further expeditions to the region in 1831 and 1832, accompanied by geologist Douglass Houghton, who became Michigan's first state geologist in 1837. Houghton explored the Keweenaw again in 1840 and the following year issued a detailed report of the region's potential mineral wealth. This, coupled with the 1842 Treaty of La Pointe, in which the Ojibwe ceded substantial lands in the western Upper Peninsula to the United States government, led to the first copper "rush" in the region (Krause 1992; Cochrane 2009). That same year, the Ontonagon Boulder was (after several failed attempts) finally removed from the riverbed where it was found and brought to Detroit for display. It currently resides at the Smithsonian Institution in Washington, DC (Lankton 1991).

The first formal American exploration of Isle Royale for minerals also took place in the early 1840s, during the period of treaty negotiations with the Ojibwe. Douglass Houghton surveyed portions of the island in 1841, while John Locke and Abel Shawk surveyed the entire island for minerals in 1843. The latter produced a map dividing the island's most promising areas into nine 3-mile square locations (Isle Royale and Ohio Mining Company 1846; Fuller 1928). General Walter Cunningham, acting as an agent of the U.S. War Department, accompanied Locke and Shawk (Mason 1851). The Isle Royale and Ohio Mining Company subsequently acquired all nine locations, though some were leased to the Siskowit Mining Company, a close contemporary and operator of the first stamp mill on the island. The Isle Royale and Ohio mining company established a small settlement, called Ransom, on the southern side of the island, near Rock Harbor. Here they also erected one of the earliest copper smelters in the region, intending to smelt their own and the Siskowit Mining Company's ore; this quickly proved a failure (Whittlesey 1848; Jackson 1849; Root 1998; Blake 2016). While the Isle Royale and Ohio focused most of their attention on the mines near Ransom, they also explored their other properties—one party working on behalf of the company undertook some exploratory work on the north shore of the island near Minong Ridge in 1847 (Ives 1855). Ultimately this first boom proved short lived, with both the Isle Royale and Ohio and Siskowit companies ceasing operations by the 1850s (Rakestraw 1965).

Sustained mineral exploration on Isle Royale is contemporaneous with the first copper "rush" that drew major capital investment to the region in the 1840s, from places such as Detroit, Pittsburgh, Cleveland and New York. On the mainland, the most successful early mines exploited copper found at opposite ends of the trap range formed by the Portage Lake Volcanics—at the Cliff Mine near the northern end of the Keweenaw Peninsula and at the Minesota [sic] Mine located at its base in Ontonagon County (Lankton 1991). While many other small mining operations failed, these two proved profitable through the 1850s, and helped sustain interest in further exploration by other companies; leading to a century of intensive copper mining. Beginning in the 1860s, attention shifted to copper lodes in the middle of the Keweenaw Peninsula, and by 1870 the area became the world's biggest producer of copper (Krause 1992). A series of larger, better-capitalized mining companies characterized this period, including the: Huron, Isle Royale, Atlantic, Quincy, Pewabic, Franklin, Osceola, Tamarack, Calumet and Hecla and (later) the Copper Range Consolidated. Initially sending their ore south by ship to cities along the Great Lakes, these mines eventually stimulated the development of a rail connection to the region and constructed their own stamp mills and smelters. Company towns and other surrounding communities swelled, with the region's population exceeding 100,000 by 1910. The region became a showcase for corporate paternalism, with numerous company towns and extensive corporate involvement in community social life. Calumet and Hecla was by far the largest of the mining companies, producing half of Michigan's copper in 1870. Throughout the 1870s, the copper mines in the Keweenaw provided

three quarters of the nations' copper, and continued to increase their output yearly until the end of the nineteenth century (Lankton 1991).

Copper production on the trap range steadily increased through the 1890s as electrification swept the United States. By this time, however, large open pit mines in western mining districts such as Butte, Montana, and in several locales within Arizona had also begun producing significant amounts of copper. As the nineteenth century turned to the twentieth, the increasing depths of extraction necessary to reach the copper lodes made mining on the trap range more expensive than at these western operations. The first two decades of the twentieth century witnessed the first declines in production, the appearance of serious labor agitation, and a depression in copper prices following World War I. From the 1920s, the native copper-mining industry on the Keweenaw entered a gradual decline, ending with the closure of the last two giants, Calumet and Hecla and Quincy, by the end of the 1960s (Lankton 1991). The scale and intensity of the copper-mining era in Michigan's Upper Peninsula is attested to by the unique mining landscape that remains to this day, and is partly preserved and interpreted by two national park units—Keweenaw National Historical Park and Isle Royale National Park. In addition, this relict landscape serves as the basis for a healthy tourism industry, which has become a major source of jobs for local communities.

While Isle Royale's mines were not among the most productive within this globally significant region, the island continued to attract attention from mining companies through the end of the nineteenth century. With copper prices rising during the Civil War, three wealthy investors formed a partnership to purchase about half of Isle Royale with the intent to mine copper. They were: George Bowen Saterlee, president of the New York Stock Exchange; William Earle Dodge, co-founder of the famous Phelps, Dodge and Company mining corporation; the third and most locally significant partner was Thomas Fales Mason, president of the Quincy Mining Company. Together they formed the North American Mineral Land Company (N.A.M.L. Company), and their purchase included much of the land worked by previous Isle Royale-based mining operations, such as the Isle Royale and Ohio and Siskowit mining companies (North American Mineral Land Company 1865; Rakestraw 1965; Barnett 2014). In 1874, three companies purchased land on Minong Ridge from the N.A.M.L. Company—the Minong, the Cove, and the Ancient mining companies. These shared a common board of directors and were essentially the same operation (Rakestraw 1965; Barnett 2014). Only the Minong Mining Company undertook any actual mining or development on its 1,455-acre tract, but in a short space of time it became the largest and most productive copper mine on Isle Royale. The Minong Mining Company's 1875 prospectus, although perhaps somewhat exaggerated to boost interest, dwelt heavily on the presence of vast precontact mining remains, proclaiming that:

> … No spot in the Lake Superior country yet discovered shows anything like the amount [of precontact mining activity] seen on this property. This was undoubtedly the great mining centre of the ancients (Minong Mining Company 1875:11).

The prospectus offered this precontact activity as a reliable indicator of extensive copper deposits waiting to be exploited:

> The ancient mines found on this property far exceed in richness and magnitude any heretofore discovered and in order to give some idea of the importance ancient mining work bears as a guide to the discoveries of rich mineral lodes, we call attention to the following extracts from early history of the island and scientific reports in relation to the subject (Minong Mining Company 1875:7).

The prospectus went on to reference testimony by surveyors such as C. T. Jackson and Foster and Whitney (see Jackson 1849; Foster and Whitney 1850), which drew a connection between precontact copper mines and far larger copper deposits underlying them that could be accessed with nineteenth century technology. They also included testimony by others with both mining and archeological experience, such as Henry Gillman and Charles Whittlesey, individuals who also had firsthand experience of Isle Royale. Typical of these is a quotation in the prospectus from Whittlesey:

> In the opening of our principal mines we have followed in the path of our ancient predecessors, but with much better means of penetrating the earth to great depths. The old miners performed the part of surface explorers (Whittlesey 1863, quoted in Minong Mining Company 1875:8-9).

Between 1875 and 1879 the Minong Mining Company poured capital into its mine on Minong Ridge. They erected dwellings, an office, warehouse, wharfs, a stamp mill, and a blacksmith shop between the head of McCargoe Cove and the far end of the workings 1.5 miles inland to the southwest. They built a wagon road and railroad to link the mine, stamp mill, and docks (Minong Mining Company 1877). Sinking several shafts, opening numerous cuts, and excavating a few precontact pits in the search for copper masses, they managed to remain productive through 1879. Their most profitable copper came from large masses, rather than the ore from the stamp mill. From 1881, when these masses were no longer found, the mine became financially marginal and was operated on tribute by independent miners. The latter continued to work the mine until 1883, after which the operation was abandoned for the last time and the land put up for sale (Hudson 1883; The Engineering and Mining Journal 1884). By then nearly half a million pounds of copper had been extracted from Minong Ridge (Rakestraw 1965).

Comparable Precontact Copper Mines and Copper Sources in North America

While float copper sources appear to be relatively widespread, few primary copper lode mining locations have been documented. Aside from Isle Royale, where fifteen precontact mining sites have been identified, Clark (1995) lists three further areas where precontact copper mining pit concentrations may be found: a trio of pits at Point Maminse at the eastern end of Lake Superior, in the vicinity of Mass City in Ontonagon County (including a substantial concentration at the Minesota [sic] Mine), and the Keweenaw Peninsula. The last two locations lie in Michigan's Upper Peninsula on the Portage Lake Volcanics, the same belt of copper bearing geology that also served as the focus of historic copper mining in the region, and was often referred to as the "trap range" (Huber 1973; Krause 1992; Martin 1999). The line of the trap range extending northeast from Ontonagon County up the Keweenaw Peninsula forms the southern limb of a syncline extending under Lake Superior and emerging in Isle Royale (Huber 1973; Krause 1992). The Minong Copper Mining District lies on this northern limb of the syncline and thus shares the same geology with the Ontonagon and Keweenaw based mining pit concentrations, giving all of these sites a similar character. Thus almost all known precontact lode-mining pits are found on this single geological formation, either in the western Upper Peninsula of Michigan or on Isle Royale.

Early Euro-American copper mineral exploration on the trap range often used precontact mining remains as a guide for locating their own prospecting and mining activities. As a result, most precontact mining pit concentrations were first observed by copper prospectors, after which geologists and early archeologists observed and described them in greater detail. Thus, most written descriptions of the contents of precontact mining pits in the region date from the early period of mineral exploration up to

the 1890s (cf. Shaw 1847; Foster and Whitney 1850; Wilson 1856; Whittlesey 1863; Gillman 1873; Lane 1898; Holmes 1901; Wood 1907).

Of the precontact copper pit concentrations observed on the trap range on the mainland, the largest appears to be the pit concentration at the Minesota [sic] Mine near Mass City on the Keweenaw Peninsula. Foster and Whitney documented scatterings of mining pits extending dozens of miles northeast from this concentration in the late 1840s (Foster and Whitney 1850). They described the site in some detail, as related by the mine's agent, Samuel O. Knapp, who made observations of the pit's morphology and their contents (Foster and Whitney 1850). The Minesota [sic] Mine precontact pit concentration, like all substantial mainland precontact pit concentrations, has never been subjected to detailed archeological survey. Moreover, most, if not all known sites on the mainland have suffered nearly continuous looting and disturbance over the last century and a half (Patrick E. Martin, personal communication, Jan 5, 2016).

Levine (1999) extensively documented native copper sources in Eastern North America. Based on her research it is clear that both float and lode copper can be found in numerous locations throughout eastern Canada (including Quebec, Nova Scotia, New Brunswick, Newfoundland, and Labrador). Even richer sources are found in New England, particularly in Connecticut where substantial masses were reported as early as the eighteenth century (Levine 1999). Native copper has also been found in the Mid-Atlantic region, particularly New Jersey, and as far west as eastern Pennsylvania (Levine 1999). While these deposits were for the most part not economically viable from a Euro-American perspective, they could have served as sources of native copper for precontact groups (Levine 1999). It is, however, important to note that no native mine workings have been identified at these sources. The archeological evidence linking these sites to precontact copper exploitation is restricted to the result of metallurgical trace analysis on a limited number of samples (Levine 2007a). Furthermore, none of the sources described by Levine appear to have been capable of supporting precontact mining activities on anything like the scale documented at the Minong Copper Mining District.

It is clear that archeologists' understanding of the actual density and distribution of precontact native copper mines in North America is incomplete. Despite this, the precontact pit concentration at Minong Mine, with a minimum 600+ pits and worked fissures, is clearly and by far the most extensive site for which detailed archeological survey data exists (Bastian 1963a; Trepal and Martin, 2015). Like all other known substantial precontact lode-mining sites, it has been subjected to historic exploration. However, the historic mining activity at Minong Ridge was relatively short lived, reducing the potential impact on the precontact remains. The overall integrity of the precontact component is excellent. Finally, it is unique in its isolated location on Isle Royale and also enjoys both National Park and Wilderness status, protecting it from the extensive and ongoing looting activities observed at the handful of other known precontact pit concentrations.

Criterion 1 Themes: Developing the American Economy, Expanding Science and technology, Transforming the Environment

Developing the American Economy

The Lake Superior basin contains the world's largest deposit of native copper. Within this region the deposits can be found in only two places: the trap range (including the Keweenaw Peninsula and the area around Ontanogan) and Isle Royale. The French, the first European explorers to reach Lake

Superior in the seventeenth century, noted the presence of this mineral wealth, with Isle Royale holding almost mythical status as an island of copper (Krause 1992). Explorers such as Étienne Brûlé, Jesuit missionaries like Claude Dablon, and government administrators such as Jean Talon all took an interest in Lake Superior native copper as a trade item and potential target for mining projects of their own. These early colonial efforts were thwarted by Lake Superior's relative remoteness and the harshness of the climate, as well as their tenuous position with respect to the native groups who had lived in the region for thousands of years.

The rumors of vast copper deposits were not forgotten, however. By the early nineteenth century, the newly formed United States sent geologists and surveyors in greater numbers to explore this region for what would be refered to today as "strategic" resources, including copper. Isle Royale, which retained its mystique as an island of copper, was the target of much of this effort. The reports of the geologists and surveyors, particularly that of Douglass Houghton, touched off a full-blown copper rush in the 1840s, and led to the region's rapid development as the world's most productive source of copper over the next three decades. As geologists developed a clearer understanding of the native copper deposits, they identified Isle Royale, along with the Keweenaw Peninsula, as a key locus of copper resources.

Despite its isolated location in Lake Superior, with all its attendant dangers and inconveniences, Isle Royale played host to some of the earliest American surveys and mining claims, as well as one of the earliest attempts at smelting copper, in the region. Of the numerous mining operations that made the dangerous and financially risky move to Isle Royale, the Minong Mining Company was the largest and most productive. It operated in the 1870s and 1880s, when the reputation of the copper mines of Upper Michigan stood at its peak. By then, the area had already distinguished itself as the majority source of the world's copper, just when the drive towards electrification in the United States made copper ever more crucial to the national economy.

While Isle Royale was not the site of the most productive native copper mines, it remains an integral geological and historical component of this globally significant region, especially during its formative years. The Minong Copper Mining District is an outstanding representation of historic copper mining activity on Isle Royale, which itself was a significant counterpart to other contemporary historical mining sites on the mainland, such as the remains of the Quincy Mining Company and the Calumet and Hecla Mining Company (McLuckie 1977; Lidfors 1998a; Lidfors 1988b; Lankton 1991; Krause 1992).

Expanding Science and Technology

The Minong Copper Mining District has played a central role in the development of archeological science as it relates to the study of precontact copper in North America. Early archeological investigations in the Lake Superior Basin, including those at Minong Ridge, explored several important archeological questions of national interest: What was the identity of the first people to mine copper in the region? How was copper mined? How old were the precontact copper mines? Were they the source of copper artifacts widely encountered elsewhere in North America, including the mound building cultures of the Midwest? A great deal of evidence crucial to addressing each of these questions has been gathered by archeologists at Minong Ridge, or through examination of types of evidence well-represented within the Minong Copper Mining District, over the last 160 years.

Establishing the Identity of Precontact Miners

Archeological interest in Minong Ridge (and the Lake Superior precontact copper mining region more

broadly) began in the 1840s, when the discipline of archeology was still in its infancy. One of the first questions posed concerning the precontact use of copper was the identity of the miners themselves. The discussion was quickly framed as a choice between the ancestors extant native groups, an "ancient" or "lost race" of miners, natives from elsewhere (such as Mexico or central America), or Old World peoples (Griffin 1961; Martin 1999). Some of the earliest discussions of this question contained well-reasoned arguments dismissing precontact transatlantic interventions (Squier and Davis 1848; Foster and Whitney 1850). Nineteenth-century archeologists found that the material evidence supported a Native American identity for the precontact miners. Some scientific observers, like Whittlesey, favored an argument suggesting the mound builders of the Midwest traveled north to mine copper, but others like Holmes, excavating at Minong, saw the precontact miners as the ancestors to the local native groups. The latter opinion became the consensus as the nineteenth century drew to a close (Whittlesey 1863; Holmes 1901).

Despite this, notions of hyper diffusion and "lost" or non-local precontact mining cultures persisted in the popular imagination. Two archeological expeditions to Minong Ridge in the first half of the twentieth century encapsulate both the durability of these myths and the application of archeological science to debunk them. The McDonald-Massee expedition of 1928 involved two capitalists traveling to Minong Ridge to look for evidence of Toltecs or the Norse. George A. West, an archeologist accompanying the expedition, used knowledge of regional ethnography, coupled with the material evidence at Minong, to clarify the identity of the miners as ancestors of modern groups:

> "Students of archaeology are almost unanimous in the belief they were Indians and none but Indians." (West 1929).

Roy A. Drier, a professor of metallurgy at the Michigan college of Mining and Technology (later Michigan Technological University) postulated a worldwide precontact trade in copper linked to the Lake Superior basin (Drier and Du Temple 1961). In the early 1950s, Drier undertook excavations at Minong Ridge for the purpose of gathering evidence for his theories. As with the McDonald-Massee expedition, an experienced archeologist, James B. Griffin, accompanied Drier for at least a part of the project. Like West, Griffin's published account of the investigation countered myth with evidence, demonstrating that the material remains matched those connected to local precontact peoples. Griffin declared attributions of the identity of precontact miners to nonlocal groups to be "clearly erroneous, sometimes fraudulent, and otherwise unsound…" (Griffin 1961:130). The myths of "lost", "inscrutable", or nonlocal ancient miners have not been completely driven from the popular consciousness. Nevertheless, the historiography of archeology at Minong serves as a model example of the ways in which archeologists moved away from such notions as the discipline developed, and the ways in which archeologists have subsequently combatted these myths.

Understanding Precontact Copper Mining Technology

One of the most important areas of research on precontact copper mining has been the investigation of extractive technologies developed by precontact miners. The Minong Copper Mining District is the best-documented precontact copper-mining landscape in North America. Excavations of pit concentrations there have yielded more data on precontact copper-mining practices than any other site. While earlier observers (including archeologists, such as Newton Winchell) had excavated precontact copper-mining pits, William Henry Holmes conducted the first recognizably modern excavation of a precontact copper-mining pit during his expedition to Minong Ridge in 1892 (Winchell 1881; Holmes 1901). Holmes exposed a vertical section of a precontact mining pit, which he documented with photographs, and

carefully recorded the pit's contents.

More modern excavations of precontact mining pits at Minong undertaken by Griffin and Bastian in the 1950s and 1960s constitute the largest set of subsurface data so far collected on precontact mines (Griffin 1961; Bastian 1963a; Bastian 1963b). Griffin's expedition returned from Minong with the largest collection of hammerstones gathered from a precontact copper-mining landscape; this collection continues to be a useful resource to archeologists (Martin 1999). Bastian developed clear criteria for identifying precontact mining pits, and established a broadly accepted typology for Lake Superior copper mines that distinguished between lode and fissure mines. Bastian also conducted experimental archeology at Minong, evaluating techniques for hammerstone use, waste rock removal methods, and the efficacy of fire setting (Bastian 1963a). Much of this work, which occurred on Isle Royale in the1960s, took place at 20IR24 on Minong Ridge. As a result, most of the modern archeological fieldwork investigation of precontact copper mining has taken place at 20IR24 on Minong Ridge.

Establishing the Antiquity of Precontact Copper Mines

A third longstanding question discussed by archeologists studying precontact copper was the antiquity of precontact copper-mining activity itself. The first attempts by nineteenth-century archeologists to establish the age of the mines relied on dendrochronology or assumptions about the time needed for mature trees to establish themselves within abandoned precontact mining pits. These suggested that the mines were at least 400-800 years old (Foster and Whitney 1850; Whittlesey 1863; Gillman 1873). Estimates of the antiquity of copper mining in the Lake Superior basin remained speculative until the 1950s, when radiocarbon dating methods provided firm data. Excavating at Minong Ridge (20IR24) in 1953-1954, James B. Griffin obtained the first radiocarbon samples from a precontact copper-mining pit in North America (Griffin 1961). Tyler Bastian obtained further samples about a decade later during his excavations at Minong. Both sets of data indicated a Late Archaic date for precontact mining activity at Minong, although the number of pits actually dated constitutes a tiny sample of the overall pit concentration (Bastian 1963a).

Other archeologists have taken advantage of new absolute dating methods to explore the antiquity of precontact copper mining in the Lake Superior basin. Once again using the Minong Copper Mining District as a laboratory, Pompeani et al. used sediment cores taken in McCargoe Cove near Minong Ridge to identify lead pollution generated by precontact mining that could be dated (Pompeani et al. 2014). In sum, while precontact copper-mining activity dating back to the late Paleoindian/Early Archaic transitional period in the region may be inferred from the presence of copper artifacts at other sites dated to that period (Martin 1999), Minong Ridge was the first area to yield absolute dates and continues to serve as the preferred site for such work. The high integrity and large size of the pit concentration at Minong offers an ideal context for the application of future dating techniques.

Sourcing Precontact Copper

Another longstanding issue surrounding precontact copper use is the geographical spread of Lake Superior native copper through precontact trade. Copper served as an important trade item within the Upper Great Lakes region beginning in the Middle Archaic and continuing through the Historic period. Copper tools and ornaments had utilitarian value as well as ritual significance, and these qualities led to a wider trade in copper beyond the Upper Great Lakes (Martin 1999; Levine 2007a). While Lake Superior-sourced copper thus appears to have been traded throughout a fairly wide portion of Eastern North America, and included major consumers of copper such as the Ohio Hopewell, the precise trade

linkages between these groups and other groups involved in extraction are still not fully understood (Martin 1999; Carr and Case 2006; Levine 2007a).

In their seminal 1848 work, *Ancient Monuments of the Mississippi Valley*, Squier and Davis linked copper artifacts they found in burial mounds in the central United States with the Lake Superior basin through macroscopic analysis of the metal itself. Writing during the first copper rush to the Keweenaw Peninsula and Isle Royale in the late 1840s, Squier and Davis compared their copper artifacts with descriptions of native copper published by geologists and mining operations working the trap range. They suggested this area as a source for the copper found in the mounds on the basis of visible silver inclusions in both the artifacts collected from the burial mounds and trap range-sourced samples (Squier and Davis 1848). Since then, a longstanding archeological consensus has emerged supporting Lake Superior copper, such as that mined at Minong, as the most widespread (though not the only) source of precontact native copper in Eastern North America (Levine 2007a).

More recent collaboration between archeologists and geologists has led to the use of trace element analysis to develop a more sophisticated understanding of precontact copper trade. Studies by Goad, Rapp, and Levine included analysis of native copper samples taken from the Minong Copper Mining District (Goad 1979; Goad 1980 Rapp et al. 1980; Rapp, Henrickson and Allert 1990; Rapp et al. 2000). These studies indicate that Lake Superior Copper may have been more widespread in the Archaic period, with more local sources becoming increasingly common in Eastern North America during the Woodland and Mississippian periods (Levine 2007a). As a major and representative source for precontact Lake Superior copper, the Minong Copper Mining District will play a substantial role in future research on these questions.

Recently, Heather Walder (2015) conducted research using laser analysis to distinguish Historic period native copper objects from European-produced copper and brass objects, among other classes of artifacts, such as glass beads. Her doctoral dissertation, which drew upon data from some thirty upper Great Lakes sites dating from the seventeenth and eighteenth centuries, included physical attribute analysis of copper-base metal objects such as “tinkling cones” cut from trade kettles. By this method, she identified patterns related to the chronology and spatial patterning of interaction during initial European contact through the early colonial period.

Despite having piqued the interest of archeologists for well over a century and a half, the archeology of precontact copper exploitation in North America remains an underexplored topic (Martin 1999; Levine 2007a). Major questions still to be answered include: gaining a better understanding of precontact copper-mining technology; gaining a more concrete understanding of the full geographic and temporal extent of primary copper-mining activities in North America; developing a more sophisticated understanding of the sourcing and distribution of native copper; and tracking shifts in sourcing and distribution patterns across time. The Minong Copper Mining District has contributed, and continues to contribute, vital data supporting important developments in the archeological study of precontact copper.

Transforming the Environment

The Minong Copper Mining District has played host to human copper-mining activity for over four thousand years, possibly longer. In that time, the landscape has been transformed into an extraordinarily well-preserved example of a Lake Superior copper-mining landscape incorporating outstanding examples of both precontact and historic activity, and, perhaps uniquely, clearly showing the cultural relationship between them. Beginning in the Archaic period, precontact visitors to the island found

bedrock outcroppings and natural fissures featuring exposed pieces of native copper. Establishing seasonal camps to hunt, fish, and forage, they also began mining or quarrying copper from the veins and fissures, excavating perhaps thousands of pits, often to a depth of 3 meters (10 feet) or more, using hammerstones and possibly fire-setting techniques. This activity continued for several thousand years, likely into the Historic period, and resulted in one of the largest precontact copper mining sites in the world. Once abandoned, the pits gradually filled with soil and decaying organic matter, yet many remain easily spotted on the landscape, as do the likely thousands of hammerstones left behind in and near the pits. A recent LiDAR survey of Isle Royale demonstrated that this transformation of the landscape at Minong Ridge can be spotted even from the air through the island's vegetation, and improvements in the resolution of LiDAR imagery promise even more detailed views of this landscape in the future (Gallagher and Josephs 2008). Other environmental clues bearing witness to long-term precontact mining have also recently been uncovered. Pompeani et al. used sediment cores [redacted] to demonstrate that precontact mining activity left a discernible mark in lake sediments in the form of elevated lead levels that can be sampled, measured and even dated (Pompeani et al. 2014). Precontact people thus left an indelible mark on the landscape as the result of intensive copper-mining activities stretching across thousands of years.

Historic copper-mining activity in the Minong Copper Mining District lasted only a tiny fraction of the time spent by precontact miners, yet its impacts are visually far more obvious. With access to steel hand tools, power drills, explosives, stamping equipment, rail transportation and steamships, nineteenth-century American miners at Minong Ridge were able wrest copper from the landscape at a pace undreamed of by their native predecessors. The adits and shafts excavated by the Minong Mining Company were orders of magnitude deeper than native excavations, though their subterranean nature means their mark on the landscape is nearly as subtle. Far more obvious are the huge piles of waste rock and stamp mill tailings, largely devoid of vegetation, that remain easily visible today from the ground or the air. Other infrastructure, such as the log dam, wagon road, rail grade, and numerous building foundations, wells, and cellar pits are also easily spotted and will remain prominent features of the landscape far into the future. Pompeani et al.'s (2014) sediment core analysis also permits a direct comparison of the pollution output of precontact and historic copper mining activity. Unsurprisingly, while the precontact pollution footprint is clearly detectible, the historic deposition of lead was far greater.

The Minong Copper Mining District is an outstanding example of the ways in which mining activity alters the natural landscape, and a unique laboratory featuring an intact, hybrid large-scale precontact / historic copper-mining landscape within a wilderness environ. While the district is now permanently protected from any further development, its many archeological features will continue to testify to human transformations of the environment for millennia to come.

Criterion 6 Themes: Peopling Places, Expanding Science and Technology

Peopling Places

While evidence from the Lake Superior shoreline indicates that human habitation in the region began soon after the retreat of the glaciers approximately 9500 YBP, the earliest evidence of human habitation on Isle Royale itself dates to the Archaic period. This evidence appears in the form of radiocarbon dates collected from precontact copper-mining pits at Minong Ridge and in sediment cores taken from nearby McCargoe Cove (Clark 1995; Pompeani et al. 2014). It shows that copper-mining activity is

contemporary with the earliest known habitation on Isle Royale. Occupation sites at Minong (20IR73) and elsewhere on the island demonstrated that native groups from the mainland visited the island seasonally and established camps to hunt, fish, gather plants, and mine copper (Clark 1995; Martin 1999; Cochrane 2009, Stroh 2014). Archeological evidence and oral tradition indicate that precontact use of the island included a number of different native groups, though comparisons of lithic artifact assemblages suggest that these visitors originated from the mainland north of the island, rather than the Keweenaw Peninsula to the south (Clark 1995; Cochrane 2009; Stroh 2014).

Native visitors to the island arrived via canoe or across the ice in winter, once Lake Superior had frozen (Clark, 1995 Cochrane 2009). McCargoe Cove served as a popular entry point to the island; it is long and well protected, terminates at the copper-mining landscape on Minong Ridge, and penetrates fairly deeply into the interior (Clark 1995; Cochrane 2009). A series of portages permits relatively easy access to Chippewa Harbor and the south shore of the island from the head of McCargoe Cove, thus avoiding a long trip by water around either end of the island.

While the first documented precontact activity on the island dates to the Archaic, numerous Woodland period sites also have been identified (Clark 1995). There is likewise ample evidence of the island's use during the Historic period by Ojibwe from Lake Superior's north shore (Cochrane 2009). The Ojibwe continued to visit the island well into the nineteenth century, with some of them being employed as fishermen by the American Fur Company in the late 1830s and by a few of the island's mid-nineteenth-century copper-mining companies (Cochrane 2009). Treaties between the Ojibwe and United States government limited the former's ability to visit Minong. These limitations, along with processes of acculturation, resulted in more sedentary living patterns and a gradual reduction of the Ojibwe presence on Isle Royale (Cochrane 2009). As time passed, the growth of the island's fishing, mining, and tourism industries further limited native access to Isle Royale, though native visitation never entirely ceased and continues to the present (Cochrane 2009). In fact, regional Ojibwe still retain subsistence rights at Isle Royale although they are not formerly exercised. Evidence clearly demonstrates that Isle Royale has served as a seasonal resource base for native peoples in the region for over 6,000 years. The island was used not only for the gathering of food, but also for the mining of copper as far back as the archeological record extends.

Expanding Science and Technology

The Minong Copper Mining District serves as an outstanding showcase of precontact Native American copper-mining technology and holds great potential to contribute valuable data on related subjects. Precontact groups mined the copper deposits on Minong Ridge for several thousand years, resulting in a huge, dense concentration of mining pits that later attracted Euro-American mining companies to the same location in the nineteenth century.

Precontact miners became adept at reading geological clues indicating the location of substantial deposits of copper in veins and fissures along the shores of Isle Royale or in bedrock outcroppings in places like Minong Ridge. While Bastian developed a simple typology for precontact copper mines based on his work at Minong (Bastian 1963a), these allow for a wide amount of variation, and this variation is expressed to its fullest extent among the hundreds of pits, fissures, and outcrops easily visible on Minong Ridge, as well as separate precontact copper mines island-wide. Archeological surveys of the Minong Copper Mining District have demonstrated that the precontact pit concentration is very large, with over 600 pits positively identified and a total number of perhaps as many as 2,000 (Bastian 1963a; Trepal and Martin 2015). Few precontact copper-mining pit concentrations have been

identified elsewhere, and even fewer approach the size of the Minong Copper Mining District (Martin 1999). The Minong Copper Mining District must therefore have served as a crucial and longstanding source of native copper for the various native groups who occupied the Lake Superior Basin, as well as those more distant groups who traded for native copper goods. Moreover, the large size of the pit cluster in the Minong Copper Mining District provides an exceptional sample size, lessening the impact subsurface archeological investigations may have on the site as whole.

Holmes noted that precontact copper-mining techniques resembled lithic quarrying techniques in some respects (Holmes 1901), and it is possible that precontact miners adapted well-known lithic quarrying methods to the mining of copper. Key to their technology was the use of hammerstones to break up the rock surrounding copper deposits. The largest archeologically curated collection of copper-mining hammerstones consists of 135 specimens collected at Minong Copper Mining District in the 1950s (Martin 1999). Precontact miners used a wide variety of hammerstones of varying sizes and hafting styles: large (over 5 kg) stones to fracture the rock around a copper deposit, followed by smaller, possibly handheld stones (~2-3 kg) for scaling and the extraction of the copper. A final stage probably involved the use of still smaller hammerstones to remove rock inclusions from the freed copper and to shape associated artifacts. The first two stages may have also involved the use of wooden wedges to help pry fractured rock loose (Martin 1999). Nineteenth-century archeologists and miners working on Minong Ridge also encountered wooden tools that were likely a part of the precontact miners' toolkit. This included a wooden oar or paddle found in 1879 at the bottom of a pit being excavated by the Minong Mining Company. Extensive wear on the blade of the paddle suggested it had been used as a shovel (Winchell 1881). Wood timbers may have also been used as scaffolding as the mining pits reached greater depths, and as skids or sleepers supporting masses being worked upon (Whittlesey 1863; Wood 1907). Copper itself may have been used to make tools for mining, such as chisels or wedges, though this supposition rests on very early historical accounts rather than archeological data (Martin 1999).

While archeologists have thus established some of the basic techniques and identified a number of specialized tools used for precontact copper mining, significant questions clearly remain. How do the variations in hammerstone hafting style and wear patterns demonstrate variation in mining techniques? Most of our knowledge of the use of wood in the precontact mining process comes from nineteenth-century observers. The wooden artifacts they recovered immediately disintegrated due to a lack of knowledge of wood conservation techniques. Given the size of the pit concentration at Minong Ridge, it is likely that further wooden artifacts remain preserved in undisturbed pits. What might modern archeological analysis of these wooden artifacts reveal? To what extent (if any) were copper tools used in the mining process? Evidence of the use of fire setting by precontact miners remains equivocal; when, and to what extent, was it used? What do precontact campsites adjacent to the mine workings look like, [redacted] and what do they reveal about the people mining copper there? No site is better equipped to support research on these questions than the dense pit concentration (20IR24) of the Minong Copper Mining District, though such a project would be a daunting endeavor. Study of this site thus holds great potential for major developments in our understandings of precontact North American native copper-mining technology.

Conclusions

The Minong Copper Mining District, comprising over 200 acres of land [redacted] serves as a unique representative of over 6,000 years of copper exploitation in the Lake Superior basin, a region hosting the oldest tradition of metals exploitation in North America. The Minong Copper Mining

District contains both precontact and historic copper-mining remains that are spatially coextensive, maintain high integrity, and are intimately linked through historical processes of mineral exploitation. Nowhere else are the linkages between precontact and historic native copper exploitation in the Lake Superior basin so clearly evident, so well preserved, and so well protected from destruction.

Additionally, the precontact and historic components are each significant in their own right. The precontact mining pit concentration at Minong may be the largest ever found, and is the only large concentration to have been extensively studied, having been the subject of archeeological inquiry for well over a century. The precontact landscape at Minong hosted several important developments in the science of archeology; the site also has the potential to yield much more data that may increase our understandings of precontact copper-mining technology. The historic remains of the Minong Mining Company represent the largest-scale copper-mining operation on Isle Royale, a remote and harsh environment that demanded unique adaptations to local conditions. The Isle Royale copper-mining landscape itself forms a significant component of the world's largest native copper-mining industry, one which achieved and maintained global significance for a century during the height of the American industrial revolution and beyond.

6. PROPERTY DESCRIPTION AND STATEMENT OF INTEGRITY

Ownership of Property	Category of Property
Private:	Building(s)
Public-Local:	District: X
Public-State:	Site:
Public-Federal: X	Structure:
	Object:

Number of Resources within Boundary of Property:

Contributing	Noncontributing
Buildings:	Buildings: 6
Sites:	Sites:
Structures: 723	Structures: 5
Objects:	Objects:
Total: 723	Total: 11

PROVIDE PRESENT AND PAST PHYSICAL DESCRIPTIONS OF PROPERTY

(Please see specific guidance for type of resource[s] being nominated)

ENVIRONMENTAL SETTING

The Lake Superior Basin formed through a combination of volcanic and glacial activity. Beginning approximately 1100 MYA, volcanic eruptions lasting 25 million years resulted in a series of very large basaltic lava flows in what was to become the Lake Superior Basin. One of these, the Greenstone Lava Flow, may be the largest individual flow on earth (Huber 1973b; Bornhorst and Rose 1994). Between periods of volcanism, erosion led to sedimentary deposition of conglomerate and sandstone beds. These were covered by subsequent lava flows; exposed sections of the lava flows on the Keweenaw Peninsula contain approximately twenty conglomerate beds within 200 lava flows (Dorr and Eschman 1977; Bornhorst and Rose 1994).

When originally deposited, the lava flows and conglomerate beds sat horizontally; once volcanic activity subsided, the deposited lava flows began to downwarp, forming a broad syncline (Huber 1973a). The eastern side of the formation (the Keweenaw Peninsula) now dips to the northwest, towards the Lake Superior's western basin, while the western side, comprising Isle Royale, dips to the southeast.

The cooling of the lava flows that form this region resulted in a frothy, permeable rock near the top of the flows or, in some cases, vesicular basalt or breccia. Both types of rocks provided favorable conditions for the precipitation of various minerals such as calcite, silver, and copper. These minerals collected in vesicles in the rock and form the native copper deposits subsequently exploited by both precontact and historic Euro-American copper miners (Dorr and Eschman 1977; Bornhorst and Rose 1994). "Native" copper is a naturally occurring yet chemically pure form of copper that does not require smelting to create a pure copper, making it a valuable resource for both precontact and historic cultures (Dorr and Eschman 1977).

In the Pleistocene Epoch, the future Lake Superior basin area experienced a great deal of glacial activity; at

times the area was covered by ice to a depth of 3000 meters (Bastian 1963a). Glacial scouring and the great weight of the ice depressed much of the region, creating the Lake Superior basin. The scouring excavated long, linear valleys on the surface that give the Keweenaw Peninsula and Isle Royale their characteristic ridged appearance (Bastian 1963b).

Following the final retreat of the glaciers approximately 12,000 YBP, Lake Superior itself appeared and experienced constantly fluctuating water levels. Boreal forest inhabited by deer, elk, caribou, and mastodon characterized the initial postglacial period (Bastian 1963a). After 9500 YBP a gradual warming led to the retreat and the replacement of the boreal forest by more southerly species. Lake levels rose, peaking in the Nipissing lake level phase between ca. 5000-4500 YBP, leaving behind relict shorelines well above the modern lake level (Martin 1999; Blewett 2009; Breckenridge 2013).

Subsequent cooling led to the return of the boreal forest, dominated by white birch, aspen, balsam fir, white spruce, sugar maple, and red oak (Flakne 2003; Pompeani, Abbott, Bain, DePasqual, Finkenbinder 2014). Precontact inhabitants of Isle Royale had access to a wide variety of plant and animal resources, many of which are extant today. Native fauna would have been typical for a southern boreal forest and included caribou, beaver, muskrat, otter, mink, hare, coyote, fox, and lynx, though several of these species were extirpated during the Historic period. Though the ecosystem currently supports a moose and wolf population, there is no evidence to suggest they were present before their migration to the island in the twentieth century. Several bird species, almost exclusively aquatic birds such as loons, grebes, mergansers, and ducks, may also have served as significant food sources (Clark 1995).

Aquatic food sources (from both Lake Superior as well as inland lakes and streams) likely served as the most reliable and readily available staple food for precontact occupants. Major species include lake trout, whitefish, suckers, sturgeon, northern pike, walleye, yellow perch, and brook trout. The island also hosts numerous edible plants exploitable by precontact peoples including blueberries, strawberries, raspberries, thimbleberries, cranberries, aquatic lily tubers, roses, high-bush cranberries, currants, beaked hazelnuts, and a variety of herbaceous greens. Native groups harvested maple sap in the nineteenth century (Clark 1995).

Cultural Setting

The Minong Ridge takes its name from the Ojibwe toponym for Isle Royale itself, meaning “the good place”. French explorers and missionaries adopted this name for the island when making their first maps of Lake Superior in the seventeenth century (Cochrane 2009). The initial human settlement of the Lake Superior basin took place soon after the receding glaciers left the area habitable approximately 9500 YBP. Numerous Late Paleoindian and Early Archaic occupation sites have been found around the Lake Superior basin (Clark 1995). Copper exploitation in the Upper Great Lakes appears to have begun very soon after the area became habitable. Site 20KE20, located on the Keweenaw Peninsula in Michigan about 70 miles southeast of Isle Royale, yielded charcoal samples associated with hammered copper with an uncalibrated radiocarbon date of 7870 ± 350 YBP (Martin 1999).

Though Paleoindian and Early Archaic sites have been found throughout the Lake Superior basin surrounding Isle Royale, the earliest archeological evidence on the island itself dates to the Late Archaic. The largest and most obvious Late Archaic site is 20KE24, the precontact copper mining pit concentration on Minong Ridge. Samples from several pits have yielded radiocarbon dates as old as 4500-4000 YBP (Griffin 1961; Bastian, 1963a; Clark 1995). Archeological survey and excavation has identified approximately 150 precontact sites on Isle Royale with dates stretching from the Late Archaic through the Terminal Woodland. Seventeenth-century French accounts by missionaries attest to the use of the island by the Ojibwe during the Historic period (Clark

1995; Cochrane 2009).

Thus, while radiocarbon samples from precontact mining pits at Minong Ridge date to the Late Archaic, the use of the island as a place of consistent, substantial seasonal native occupation, fishing, hunting, and gathering as late as the mid-nineteenth century is abundantly documented by traditional oral, archeological, and historical sources (Rakestraw 1964; Clark 1995; Martin 1999; Cochrane 2009). Natives travelling to the island arrived either by canoe or by crossing the frozen lake in the winter (Clark, 1995 Cochrane 2009). [redacted] which provides easy, sheltered access from the north shore to the island's interior, likely served as a primary point of entry to precontact visitors and terminates close to Minong Ridge (Clark 1995; Cochrane 2009).

Site Description

The Minong Copper Mining District is approximately 1.8 miles long and 0.5 mile wide, encompassing an area of 211.5 acres. The district includes a segment of Minong Ridge containing the largest concentration of precontact mining pits on Isle Royale, and portions of smaller ridges to the south of Minong Ridge that also feature precontact mining activity. The remains of the nineteenth-century Minong Mining Company (1874-1883) operations occupy portions of Minong Ridge (overlapping some precontact features), as well as the swampy lowland to the south of the ridge. The National Historic Landmark district substantially expands the boundary of the Minong Mine Historic District inscribed into the National Register of Historic Places in 1977 (McCluckie 1977).

The site consists of both precontact and historic components. The primary precontact component (Michigan state site number 20IR24) consists of a dense concentration of at least 612 precontact copper mining pits (possibly over 2,000 according to Bastian's estimates) on the southern face of Minong Ridge that average about 2 meters in diameter and are covered in soil, leaf duff, and/or forest undergrowth. The pits appear to be shallow, but previous excavations have shown that some reach a depth of up to four meters (cf. Bastian 1963a). Hammerstones can be found on the surface in or near many of the pits. In addition to the primary pit concentration, a few additional pits can be found on high ground on the north side of Minong Ridge and on several small ridges at the southern boundary of the district. The district also contains one site with a precontact occupation component, [redacted] located near the modern campground (Bastian 1963a).

The historic component consists of the remains of the Minong Mining Company operations. These can be roughly divided into three areas: the mine workings, a stamp mill, a log dam area (also included in 20IR24), and the Cove village site, including dock remains (forming part of 20IR73). The remains of a wharf and warehouse site, also owned by the Minong Mining Company and situated at the mouth of McCargoe Cove two miles northeast of the modern NPS campsite, are not included in the district (Rakestraw 1967; Lenihan 1987). A wagon road and narrow-gauge railroad, each roughly a mile long, link the three components. [redacted] The historic mine workings are located about 1.2 kilometers (0.75 miles) further inland on the densest concentration of precontact pits on Minong Ridge and in the lowlands at the southern foot of the ridge, and include shafts, poor-rock piles, and the remains of ore cars (Rakestraw, 1964; Lenihan, 1987). No standing structures remain. The blacksmith shop, a log structure located at the foot of Minong Ridge near the poor-rock piles, is the best preserved extant structure and retained all four walls to a height of six or seven log courses as late as the 1970s (McLuckie 1977). Today, only a portion of one corner remains visible. The log dam, [redacted] broke in 1974 due to beaver activity but remains identifiable, with remains of the stamp mill located 125 meters to the southeast; the mill remains consist of wooden and stone foundations,

iron mounting rods, and artifact scatters (Rakestraw 1964). Portions of the wagon road and the foundations of several structures are visible and easily accessible from the trail system, as are several of the shafts and the poor-rock piles.

Site Integrity

Both the precontact and historic components of the Minong Copper Mining District retain a high overall degree of archeological integrity. Relatively few precontact native copper mines are known, and all are found in the Lake Superior basin (S. Martin 1999). The precontact mines on Minong Ridge may be the largest such concentration (P. Martin, 2015, pers. comm.), and of these it is the only site enjoying national park and wilderness status. Access to the site has always been difficult, requiring either a dangerous traverse over the ice in the winter or a long boat journey from the mainland; more recently it has become possible to access the island via aircraft. The remoteness of Isle Royale limited historic activity at Minong Ridge; thus, most historical disturbance of the site resulted from the historic mining efforts of the late 1870s through the early 1880s. While it is clear that the Minong Mining Company deliberately located its operation within the densest concentration of precontact pits (Minong Mining Company 1875; Dustin 1930), the overall number of pits disturbed by historic mining activity appears to be small in proportion to the total number present on the landscape today (Bastian 1963a). The appearance of the precontact pit cluster matches early descriptions of the appearance of undisturbed precontact mines by Foster and Whitney from the mid nineteenth century (Foster and Whitney 1850), suggesting that most of the pits in the cluster have remained untouched since precontact mining activity ceased. The placement of the modern NPS campsite at the head of McCargoe Cove over parts of 20IR73 will require careful management to mitigate further disturbance.

The Minong Mining Company property itself was visited numerous times after operations ceased in 1883. Holmes, for example, based himself in one of the Minong Mining Company's abandoned buildings during his archeological investigations at Minong Ridge in 1892 (Holmes, 1901). Most of the archeological expeditions to Minong since that of Holmes made note of the historic remains. Finally, given the general scarcity of building materials and equipment on Isle Royale during its decades of commercial exploitation, prior to achieving national park status, it is reasonable to assume that fishermen and other seasonal residents scavenged the site prior to its protection as part of a national park and wilderness area.

With that being said, all of the major components of the Minong Mining Company's operation remain extant in the form of ruins (Bastian, 1963a; Rakestraw 1964; P. Martin, S. Martin, and Gregory 1989; Clark 1995). These ruins confer a high degree of integrity of setting and association, as the precontact and historic remains are clearly juxtaposed on the landscape. More important, the wilderness status of Isle Royale National Park, coupled with relatively low visitor traffic, greatly reduces the likelihood of disturbance to the Minong Copper Mining District and will serve to maintain the site's high integrity for the foreseeable future.

Contributing Resources

The archeological resources constituting the Minong Copper Mining District consist of the [redacted] The latter consists of at least two shafts, the remains of numerous structures, poor-rock piles, tramway remains, a wagon road, a log dam, stamp mill remains, and wooden dock remains.

Minong Ridge Precontact Mining Pits (20IR24)

The primary precontact feature of the Minong Mine is an extensive cluster of precontact copper mining pits that [redacted] Bastian divided the precontact mine pits found on Isle Royale into two classes: lode mines (circular or oval pits) and natural fissures showing evidence of precontact excavation; the historic Minong Mining Company operation later exploited both types (Bastian 1963a). Despite the long history of archeology on [redacted], the 2015 survey was the first to map the cluster in its entirety (Trepal and Martin 2015). Most previous archeological surveys and pit excavations either neglected to describe the locations of the pits excavated, or (as with Griffin and Bastian) the locations were recorded at a gross level of detail, whichmakes relocating them difficult if not impossible, given the density of similar-looking pits within the cluster. The exception to this is Hamilton Carson's 1963 metal detector survey, [redacted] drawn to scale and juxtaposed with the location of positive metal detector readings (Carson 1963). This map also shows the location of the pits Bastian excavated, though the accuracy of the map has not been confirmed through field observations. Bastian counted, but did not map, 1,041 distinct pits and worked fissures within the "southwestern 1.1 miles" of the cluster (Bastian 1963a, p.42).

Bastian estimated the total number of pits on [redacted] did not exceed 2,000; the 2015 survey team identified and mapped 612 precontact pits and trenches. Holmes's sketch map shows hundreds of pits within a twenty-acre area of the cluster surrounding the historic Minong Mining Company workings (Holmes, n.d.). His map suggests a density greater than that observed by either Bastian or the 2015 survey. However, it is important to note that [redacted] had been cleared by forest fire in 1885, making Holmes's survey of pit numbers and locations far easier than any time before or since (Holmes n.d; Holmes, 1901; Lenihan 1987). Given the extent to which even the larger pits have become obscured by long-term site formation processes (Trepal 2015, Trepal and Martin 2015), Bastian's maximum estimate of 1,500-2,000 pits is reasonable, and would distinguish 20IR24 as the largest documented precontact copper-mining site in the Americas by a comfortable margin.

The pits within the [redacted] vary in size and shape, but the majority appear as shallow circular or ovoid depressions about two meters wide at the surface; in many places the cluster of pits is so dense that they directly abut or even overlap each other. A few mining pits take the shape of elongated trenches or excavations within natural fissures. Excavations at Minong by Davis, Holmes, Griffin, and Bastian demonstrated that the pits often proved to be much larger once overburden and waste rock were removed, reaching widths and depths of up to 4 meters or greater (Davis 1875; Holmes 1901; Griffin 1961; Bastian 1963a). Most of the lode pits exposed a thin vein, but occasionally the pits contained a large mass, such as one weighing 5,720 pounds found by A.C. Davis at the bottom of a pit on Minong Ridge in 1875, or two further masses of 3,317 and 4,175 pounds respectively that Holmes noted as having been taken from the same general location in 1879 (Davis 1875; Holmes 1901; Martin 1999). Numerous hammerstones may be found in and around many of the pits, and are almost always found in substantial numbers when excavating them (Holmes 1901; Griffin 1961; Bastian 1963s).

Substantial, documented excavations of mining pits on [redacted] were undertaken in 1892 by Holmes, in 1953 by Griffin (working with Drier), and by Bastian in 1960-1962 (Holmes, 1901; Griffin 1961; Bastian 1963a). Holmes's 1892 excavation at [redacted] focused on a single large lode pit on a steep slope that he estimated to be ten feet (3 meters) deep and twenty feet (6 meters) in diameter (Holmes 1901). Holmes photographed his excavation and his neat bisection reveals over a dozen hammerstones *in situ*, scattered throughout the profile, with several dozen excavated hammerstones piled at the bottom of the pit. The pit fill showed little to no stratification, a feature typical of the precontact lode mines at Minong and subsequently

remarked on by other archeologists working there, such as Griffin and Bastian (Griffin 1961; Bastian 1963a; Martin 1999).

In addition to the pit cluster found on Minong Ridge, the 2015 survey team identified several additional precontact pit features and three mound features, believed to be precontact, within 20IR24 on two smaller ridges near the southern border of the district (Trepal 2015; DePasqual 2016).

1874-1885 Minong Mining Company Property (20IR24)

Though the Minong Mining Company property consisted of 1,455 acres of land on the north side of Isle Royale (Minong Mining Company 1875), only the area within the current 211.5-acre district boundary experienced intensive and sustained mining activity and occupation. [redacted] Numerous small historic exploratory trenches are scattered among the precontact pits surrounding the larger historic excavations. The stamp mill and dam remains are situated approximately one kilometer east of the main workings.

The historic mining operation relied on several different infrastructural components, all of which survive as archeological ruins. A wagon road built in 1874-1875 ran approximately one mile along Minong Ridge southwest from the village of Cove to the mine workings (Minong Mining Company 1875; Rakestraw 1964). [redacted] Aside from the main wagon road running from Cove to the mine workings, Rakestraw identified a second segment of road at the south of the property that ran east from the mine workings to the dam. This road may have been a temporary access used during the construction of the dam and/or stamp mill (Rakestraw 1967; DePasqual 2016).

A third road segment identified by Rakestraw appears to run from [redacted] A.C. Davis reports that this area was first explored in 1875 by enlarging two precontact pits, excavating at least six costeans or exploratory trenches. A fifty foot (15 meter) shaft was subsequently opened over a precontact pit on the ridge's south side in 1876 (Minong Mining Company 1876; Minong Mining Company 1877). Rakestraw observed the remains of two small shafts in this area (Rakestraw 1965; Rakestraw 1967), and the 2015 survey team recorded a small timber-lined, water-filled shaft with an adjacent poor-rock pile in the same general area as the shaft mentioned in the 1877 report (DePasqual 2016; Trepal 2015). While these explorations yielded some copper, they do not appear to have ever been fully developed before mining operations ceased (Minong Mining Company 1876; Minong Mining Company 1877).

In addition to the wagon road, the Minong Mining Company began construction of a 1.5 mile (2.4 kilometer) railroad or tramway in 1875 that served to bring ore from the workings to an ore dock near Cove and subsequently via a spur to the stamp mill, and possibly also linked to the dam (Minong Mining Company 1876; Minong Mining Company 1877; Rakestraw 1965; Rakestraw 1967). The 1876 annual report lists 6,500 feet (2 kilometers) of "good, substantial T railroad track" (Minong Mining Company 1876:14), eighteen railroad cars (increased to 21 the following year), and three horses and one yoke of oxen among the company property (Minong Mining Company 1876; Minong Mining Company 1877). Most of the rails were removed as scrap during World War I, but the eight-inch flat wooden stringers and notched ties remain *in situ* on the rail bed, which uses poor rock as ballast (Minong Mining Company 1876; Rakestraw 1967). As of 2016, a 140-meter

segment of the railroad immediately to the east of the mine workings lies submerged under a large beaver pond. The 1876 Minong Mining Company annual report mentions the presence of a boarding house and separate houses for an engineer, smith, and "surface man" at the mill site (Minong Mining Company 1876:10). Rakestraw noted an "area of occupation" located "about half-way between the mine and the stamp mill…with a number of cellar holes and building foundations." DePasqual also noted foundations in the same vicinity along the rail bed, though this area has not yet been intensively surveyed. These may be the remains of the dwellings listed in the annual report, and represent a third area of living quarters distinct from those to the north along the wagon road and those within the town of Cove itself (Rakestraw 1967:47; DePasqual 2016).

The Minong Mining Company's main workings are located [redacted] The Minong Mining Company's initial mining activity consisted of excavating precontact pits, and they continued to work surface pits even after they began to sink shafts (Minong Mining Company 1876; Minong Mining Company 1877). Two large surface workings approximately sixty meters apart, referred to as the east and west cuts in the annual reports, appear to have been the focus of surface operations (Minong Mining Company 1877). These are visible today as large excavations paralleling Minong Ridge with a series of large poor-rock piles standing immediately to the south with associated artifact scatters, including the remains of ore cars and the remains of the blacksmith shop (Rakestraw, 1967; DePasqual 2016; Trepal 2016). The west cut measures approximately 140 meters in length, while the east cut measures approximately 200 meters in length.

The first shaft excavated on the property was a small one that A. C. Davis sank 100 feet (thirty meters) south of where he had previously uncovered a large 5,720-pound native copper mass at the bottom of a fifteen foot (4.5 meter) deep precontact pit (Davis 1875; Minong Mining Company 1876; Gillman, 1876; Winchell 1881). Davis ceased excavating after reaching a depth of twenty-six feet (eight meters) due to excessive groundwater, and the shaft is not mentioned further in historical sources (Minong Mining Company 1876). Davis identified the location of the precontact pit that yielded the large mass only by township, range, and section (Davis 1875), and neither it nor the shaft have been positively identified by subsequent surveys.

The primary underground workings on the Minong Mining Company property consist of a shaft sited directly between the east and west cuts, approximately one mile by the old wagon road (now the modern NPS trail) from the Cove village site/NPS campsite. The Minong Mining Company began excavating the shaft in October 1876, using diamond drilling to identify the most suitable location (Minong Mining Company 1877). The annual report, dated September 1877, lists the shaft as having reached a depth of 200 feet, containing several levels and drifts (Minong Mining Company 1877). This water-filled shaft, along with its partially collapsed adit, lies directly adjacent to a modern spur trail running south from the old wagon road down into the mine workings.

A large area of poor-rock piles over seven acres (2.8 hectares) in area lie immediately to the south of the main shaft and east and west cuts. These piles were first recorded by Holmes in his undated sketch map of part of Minong Ridge (Holmes n.d.), are still clearly visible today and take the form of both amorphous piles of poor rock and finger-like linear piles formed by sustained dumping along a railroad track. These are especially evident at the west cut, where the 1877 annual report mentions that:

> …two new side-tracks were put in near the west cut to use for dumps; the track was elevated some four feet so as to increase the capacity and save long hauls of the dead rock" (Minong Mining Company 1877, p. 12).

The dam serving the stamp mill is of log design and was likely constructed in 1875 to supply the stamp mill

(Minong Mining Company 1876). Rakestraw described it as being "in a remarkably good state of preservation," 12 feet (3.6 meters) high, of cedar log construction and featuring a flume gate, with several ore cars scattered nearby (Rakestraw 1967). By 1974, however, beaver activity led to increased backpressure on the dam, which broke. Today only several tiers of logs remain in situ (McCluckie 1977; DePasqual 2016).

The stamp mill itself is situated [redacted] The Minong Mining Company constructed the mill in 1875 at a total cost of $16,000, installing a single Ball No. 5 stamp head, a Blake's No. 2 rock breaker, and six Collom's patent jiggers. Power was provided by a "horizontal [steam] engine, 12 by 20 [feet]" and a "Marine pattern" boiler (Minong Mining Company 1876:13-14; Minong Mining Company 1877). The stamp mill site today consists largely of foundations as well as the iron mounting bolts for the Ball No. 5 mill; Rakestraw identified the mill remains as a 36 by 18 foot (11 by 5.5 meter) foundation and tailrace, with the boiler having a detached foundation nearby as well as a possible stable location (Rakestraw 1967).

McCargoe Cove 1 (20IR73)

McCargoe Cove 1 contains both precontact and historic components. Bastian (1963a) identified an ephemeral Middle or Late Woodland occupation site [redacted]. This site is spatially coextensive with both historical components of the Minong Mine site (20IR24) and [redacted]. Bastian surface collected fifteen flint flakes and one scraper during the 1960-1962 seasons. Subsurface testing of the site in 1961 "produced a few additional flint flakes" (Bastian 1963a, p.27). Bastian also found both modern trash and nineteenth-century artifacts (white clay pipe fragments and an olive glass fragment) in the same location. Further surface collection by Martin in 1986 and 1987 yielded further bottle glass and pipe fragments, as well as .22-caliber firearms cartridge casings (Martin 1986; Martin, Martin, and Gregory 1989; Clark 1995). Clark collected additional lithic debitage from the site in 1988. Clark also found worked copper artifacts, but suspected that they might be historic in origin given the intensity of historical Minong Mining Company activity in the same area (Clark 1995). The 2015 survey team surface collected a precontact copper awl, probably dating to the Woodland period, [redacted] (DePasqual 2016). Though ephemeral and exposed to disturbance from historical mining activity and modern camping, 20IR73 is the only precontact occupation site positively identified within the district boundary.

20IR73 also encompasses the remains of the town of Cove, which Rakestraw identified as being [redacted] (Rakestraw 1967:45). Previous surveys (cf. Rakestraw 1967; McLuckie 1977; Lenihan 1987, Clark 1995) identified Cove as the primary settlement for the Minong Mining Company operation, and appear to have relied largely Minong Mining Company annual reports (1876, 1877) and Swineford (1876) in describing Cove's built environment. These reports typically describe Cove as consisting of a dock, a store/office, a boarding house, and a warehouse (McLuckie 1977; Lenihan 1987, Clark 1995). These structures are among those listed in the 1876 company annual report (Minong Mining Company 1876). Minong Mining Company reports and Swineford list the buildings constructed on the property, but apart from the dock did not identify which were located at Cove and which elsewhere (Minong Mining Company 1876; Minong Mining Company 1877; Swineford 1876).

Rakestraw found the remains of an ore dock, the terminus of the railroad running from the mine and stamp mill, about [redacted] Several subsequent surveys failed to relocate it, though DePasqual has recently identified the terminus of the tramway a short distance inland during recent surveys (Rakestraw 1967; McCluckie, 1977; Lenihan, 1987; DePasqual 2016). Vrana and McWilliam's 1984 underwater survey located the remains of a rock-filled wooden crib dock "just a few feet northeast of the current NPS dock;" Lenihan speculated that this might represent the remains of the ore dock,

though damage from prop wash and dredging left the feature in poor condition (Lenihan 1987). Vrana's underwater survey identified the remains of two further docks at the head of McCargoe Cove, approximately 125 meters northeast of the current NPS dock: a 30-35 foot (9-10.5 meter) long, rock-filled wooden crib running parallel to the shore, and a smaller dock, also of wooden-crib construction, a short distance to the north (Lenihan, 1987).

The village of Cove has never been fully surveyed, though Vrana and McWilliam recorded two structures on the shore near the pair of dock remains documented by Lenihan, described and discussed above (Lenihan 1987). DePasqual identified one large structure foundation within the modern NPS campsite area, and the 2015 survey identified one further possible foundation near the old wagon road/modern trail approximately 100 meters away from the shore (DePasqual 2016; Trepal 2015). (See sketches and maps by Patrick E. Martin and field school concerning additional structures.)

Recent field surveys, coupled with a review of the Minong Mining Company annual reports, cast doubt on the assumptions by McLuckie, Lenihan, Clark, and others that the town of Cove served as the primary locus of Minong Mining Company employee dwellings. The 1876 Minong Mining Company annual report, as well as the field observations of Rakestraw and DePasqual, suggest a substantial area of dwellings probably existed [redacted] (Rakestraw 1967; DePasqual 2016). In addition, DePasqual and the 2015 survey team identified six potential building foundations and two wells to the [redacted] hundred meters of the mine workings. These appear to be the remains of dwellings (DePasqual 2016; Trepal 2015). It is therefore likely that the Minong Mining Company crew's dwellings were somewhat dispersed throughout the property, making it difficult to associate specific dwellings listed in the company reports (and subsequently repeated by Rakestraw, McLuckie, Lenihan, and Clark) as having been located in Cove. An 1885 forest fire burned the Cove site, including its cemetery; the latter has never been located (Rakestraw 1967; Lenihan 1987).

Non-Contributing Resources

McCargoe Cove NPS Campsite

The NPS established a public use campsite with a dock at the head of McCargoe cove in the mid-1940s, and has expanded it several times since (Seth DePasqual, personal communication, September 6, 2016). The camp consists of six Adirondack shelters, three individual tent sites, three group tent sites, and three permanent latrines, a fire pit, and a dock. [redacted] Parts of the wagon road and at least one structure foundation were either disturbed by the creation/expansion of this site or can still be found within the campsite. The campsite also sits on the only precontact occupation site (20IR73) so far identified within the district boundary.

Previous Investigations

Early archeological interest in the Minong Mine is closely associated with broader investigations of ancient native copper exploitation in the Lake Superior region. These became the focus of sustained archeological interest beginning in the latter half of the nineteenth century (Martin 1999; Levine 2007a). Attempts to identify the source of native copper artifacts found in Midwestern precontact burial mounds led geologists and archeologists to the identification of the Lake Superior region as the likely origin of the artifacts (Squier and Davis 1848; Foster and Whitney 1850; Wilson 1856). This was made possible partly because historic mining

activity in Michigan's Upper Peninsula and on Isle Royale beginning in the 1840s brought attention to evidence of precontact native copper-mining activity and artifacts containing concentrations of silver matching that of the burial mound finds (Martin 1999).

While the French were aware of the presence of copper on the island as early as the seventeenth century (Costain, 1970; Krause 1992), the first direct Euro-American observations of precontact mining activity on Isle Royale itself date to the middle of the nineteenth century, and coincide with the first serious mineral explorations there. Douglass Houghton surveyed small portions of Isle Royale in 1841. A few years later, following John Locke and Abel Shawk's more comprehensive 1843 survey of the island, the Isle Royale and Ohio Mining Company established mining claims on the island and sent several parties to undertake exploratory work there, including a group the surveyor William Ives observed on the north shore of the island near Minong Ridge in 1847 (Isle Royale and Ohio Mining Company 1846; Mason 1851; Ives 1855; Fuller 1928).

C. G. Shaw identified precontact fissure mines on the Greenstone Ridge, while copper prospecting near the northeastern end of Isle Royale was carried out as early as 1847 (the Lookout Mine site, 20IR30); subsequently he excavated one of them (Shaw 1847; Foster and Whitney 1850; Bastian 1963a). Charles Whittlesey developed both archeological and business interests at Isle Royale, having been noted by U.S. geologist C. T. Jackson as being involved in a mining operation there in 1847, though it is unclear whether he was personally present during Jackson's expedition (Jackson 1849). Whittlesey also identified precontact mining pits and excavated several in Houghton County at the base of the Keweenaw Peninsula, then an active copper-mining district. He also discussed precontact mining activity on Isle Royale in his archeological writings and probably visited the island during the 1860s (Whittlesey 1863; Martin 1999). Alvinus B. Wood observed the presence of "extensive ancient mining" on the "easterly part of Isle Royale" during his 1855 expedition to the region (Wood 1907, p. 292).

The first documented archeological excavations at Minong Ridge took place in the 1870s. A. C. Davis served as the superintendent and agent for the Minong Mining Company from 1875-1877. He collaborated with archeologist Henry Gillman in exploring precontact mining remains on Isle Royale (Gillman 1873; Wood 1907; Griffin 1961). Gillman and Davis identified the concentration of pits on Minong Ridge as being especially dense, and their excavations of precontact mining pits yielded a wide variety of artifacts, including "cart loads" of hammerstones, copper tools, and wooden artifacts such as a bowl (Gillman 1873:19-20). Davis excavated one precontact mining pit to a depth of 15 feet (4.5 meters), exposing a 5,720-pound native copper mass surrounded by hammerstones and showing extensive evidence of having been worked to remove copper (Davis 1875; Gillman, 1876; Winchell 1881). Davis photographed the mass *in situ* and shipped it to Detroit (Davis 1875). It was displayed at the 1876 Centennial Exhibition in Philadelphia before eventually being melted and sold as commercial copper, after attempts to sell it to the University of Michigan failed (Winchell 1881; Wood 1907).

Newton H. Winchell, then State Geologist of Minnesota, conducted fieldwork at Minong Ridge in 1879 (Griffin 1961). While he collected numerous artifacts himself, his account also includes summaries of Gillman and Davis's findings as well as those of amateurs and other visitors to Isle Royale. The true extent of his own activity at Minong Ridge is not entirely clear (Winchell 1881).

The first recognizably modern archeology at Minong Ridge took place under the direction of Smithsonian and Field Museum archeologist William Henry Holmes in 1892 (Holmes 1901). Holmes travelled to Minong Ridge to study ancient mining techniques and collect artifacts for display at the 1893 Columbian Exposition, taking advantage of contemporary mining disturbance of precontact features to excavate a cross-section of a pit. His documentation included a number of photographs of the pit as well as the broader archeological landscape

within a decade of the cessation of historic mining operations on Minong Ridge (Holmes 1901; Rakestraw 1965). Holmes also drew a sketch map showing the locations of numerous precontact pits on Minong ridge in proximity to the Minong Mining Company workings (Holmes n.d.).

Numerous amateur archeologists of varying levels of experience visited Minong Ridge in the decades following Holmes' investigations. Amateur archeologist George R. Fox surveyed Isle Royale in 1911. He singled out the McCargoe Cove area as the most significant concentration of precontact mining pits on the island. His account contains summaries of previous work by Gillman, Winchell, and others, but he did not perform any excavations while on Isle Royale (Fox 1911).

Several expeditions to Minong Ridge took place in the 1920s. Pennsylvania newspaper editor and amateur archeologist William P. F. Ferguson excavated at Minong Ridge in 1923 and 1924 (Griffin 1961). Anthropologist Samuel A. Barrett and amateur archeologist George A. West undertook survey and excavation work at Minong Ridge in 1924 on behalf of the Milwaukee Public Museum. Barrett and West excavated and photographed one precontact pit (Griffin 1961). Eugene F. McDonald, Jr. and Burt A. Massee, both successful capitalists and dilettante archeologists, made an expedition to Minong Ridge in 1928, accompanied by West, though they did not undertake any excavations (Martin 1999).

Beginning in 1929 Fred Dustin, an experienced and diligent amateur archeologist, surveyed Isle Royale for precontact remains on behalf of the University of Michigan's Museum of Anthropology (Griffin 1961). Dustin surveyed Minong Ridge, identifying the precontact mining pit concentrations there as "the most interesting precontact mines yet discovered on the Isle" (Dustin 1930:22), with "the very richest of the Indian workings" extending for a mile along the ridge, with the historic Minong Mining Company workings in the middle of this concentration (Dustin 1930:25). Dustin returned to the Island several times over the next twenty years (Martin 1999).

Roy W. Drier, a professor of metallurgy at the Michigan College of Mining and Technology (today Michigan Technological University), excavated a precontact mining pit on Minong Ridge in 1953-1954. Drier had no previous archeological experience and was accompanied by National Park Service archeologist Paul L. Beaubien and University of Michigan Archeologist James B. Griffin (Martin 1999). The Drier-Griffin excavations yielded the first radiocarbon dates collected at Minong Ridge; these placed precontact mining activity well within the Late Archaic period (Griffin 1961; Martin 1999).

Archeologist Tyler Bastian, working under the auspices of the University of Michigan's Museum of Anthropology, conducted three years of survey and excavation work on Isle Royale from 1960-1962, focusing on precontact copper mining sites (Bastian 1963a). Bastian's work represents the most careful and focused investigation into precontact mining in the Lake Superior region (Martin 1999). In addition to survey and excavation elsewhere on Isle Royale, Bastian performed a detailed survey of the Minong Mine site on Minong Ridge (20IR24) and excavated several precontact mining pits there as well as a nearby occupation site in McCargoe Cove (20IR73) (Bastian 1963a; Clark 1995). He and his field crew also conducted experimental archeology on the use of fire as a precontact mining technique while on Minong Ridge (Bastian 1963a).

Hamilton Carson undertook a metal detector survey of most of the Minong Ridge prehistoric pit concentration in 1963. He produced a detailed base map of his survey area showing the location of hundreds of precontact mining pits, a few historic structures, and positive metal detector readings (Carson 1963). While many of the previous archeologists noted the presence of the Minong Mining Company's nineteenth-century mining operation, the historic remains at McCargoe Cove and on Minong Ridge were not treated as a subject of interest until the 1960s. In 1964, Lawrence Rakestraw, a professor of history at Michigan Technological University

visited the Minong Mining Company property (Rakestraw 1964; Rakestraw 1965; Rakestraw 1967; McLuckie 1977). Rakestraw identified and described various extant historic building remains, structures, and features at the site, and subsequently incorporated this (along with the results of archival research and interviews with descendants of contemporary observers) into a monograph covering historic mining on Isle Royale (Rakestraw 1964; Rakestraw 1965). Ten years later Jane McCluckie visited the site while preparing a National Register of Historic Places nomination for the Minong Mining Company property (McLuckie 1977).

The NPS Submerged Cultural Resources Unit conducted underwater archeological survey on Isle Royale between 1981 and 1986 (Lenihan 1987). Park Ranger Ken Vrana undertook several dives in McCargoe Cove in 1982 and 1984, surveying the Minong Mining Company docks and wharves (Lenihan 1987).

Between 1986 and 1988, Patrick E. Martin led an archeological survey crew from Michigan Technological University in surveys of Isle Royale focusing on historical archeological remains, including those of the Minong Mining Company (Martin, Martin, and Gregory 1989). Martin's team documented portions of the Minong Mining Company's dock, wagon road, tramway, and several structures near the head of McCargoe Cove in 1986 and 1987 as part of an expansion of camping facilities at that location by the NPS (Martin 1986; Martin, Martin, and Gregory 1989; Clark 1995). Though numerous historic features were identified during these surveys, the historic mine workings have never been comprehensively mapped.

Caven P. Clark of the National Park Service's Midwest Archeological Center (MWAC) led survey and excavations on Isle Royale for four seasons between 1987 and 1990 (Clark 1995). Clark's team selectively surveyed Isle Royale's shoreline by boat and undertook several pedestrian survey and excavation projects in the island's interior; his report also summarized previous work undertaken at each known site (Clark 1995). Clark surface collected artifacts at the occupation site at McCargoe Cove I (20IR73) previously excavated by Bastian, but they did not investigate Minong Ridge (Clark 1995).

Gallagher and Josephs used LiDAR data collected at Minong Ridge and two other sites on Isle Royale in 2004 to demonstrate the value of LiDAR as an archeological prospecting tool (Gallagher and Josephs 2008). Gallagher and Josephs created a digital elevation model (DEM) from 2-meter resolution LiDAR scans of Isle Royale. They used this to locate several new historic archeological features not previously identified through field survey (Gallagher and Josephs 2008). With an average diameter of approximately 2 meters and fairly shallow (unexcavated) depth, most precontact mining pit features fell just outside the limit of detectability using this approach.

In 2009 a small crew from the NPS Midwest Archeological Center (MWAC) surveyed a portion of Minong Ridge as part of a three-year inventory of precontact mining sites on Isle Royale. Following the modern trails system, the MWAC crew documented 31 precontact mining pits on Minong Ridge between McCargoe Cove and Little Todd Harbor. Their surveys focused on the ridgeline west of the Minong Mining District.

In 2012 a team from the University of Pittsburgh's Geology and Planetary Science program collected sediment cores from McCargoe Cove 0.1 kilometers from Minong Ridge. Analysis of these cores suggests that precontact mining activity left evidence in the sediments in the form of elevated lead levels, which can be measured and dated (Pompeani et al. 2014). The results confirm the presence of mining activity during the Archaic period, though their dates are slightly earlier than indicated by the radiocarbon dates obtained previously by Griffin and Bastian.

In the summer of 2015, an archeological field crew from Michigan Technological University conducted a pedestrian survey covering the precontact pit concentration and adjacent areas. Using handheld GPS units, they

recorded both precontact and historic features, establishing a district boundary to support the preparation of this National Historic Landmark nomination (Trepal and Martin 2015).

In addition to the investigations mentioned above, the Isle Royale National Park cultural resources staff have undertaken numerous pedestrian GPS surveys and site condition reports of portions of the Minong Mining District since 2010, as well as recording all opportunistic finds encountered within the district. These surveys formed the basis of the site GIS subsequently enlarged by the 2015 survey (see DePasqual 2016 for summaries).

7. BIBLIOGRAPHICAL REFERENCES AND OTHER DOCUMENTATION

Anderson, David G. (2015). Pleistocene Settlement in the East. In Pauketat, T. R. (Ed.), *The Oxford Handbook of North American Archaeology*, pp. 96-107. New York: Oxford University Press.

Barnett, L. (2014). Isle Royale: many owners, many ambitions. *Chronicle: Membership Magazine of the Historical Society of Michigan, 37*(1), 20-23.

Bastian, T. J. (1963a). Archaeological Survey of Isle Royale National Park, Michigan, 1960-1962. Unpublished report, Midwest Archaeological Center, National Park Service, Lincoln, NE.

Bastian, T. J. (1963b). *Prehistoric Copper Mining in Isle Royale National Park, Michigan*. Unpublished Master's thesis, Department of Anthropology, University of Utah, Salt Lake City, UT.

Blake, A. (2016). Early Copper Smelting In the Lake Superior Region: A Case Study of the Isle Royale and Ohio Mining Company, 1846-1852 (M.S. Thesis, Michigan Technological University Houghton, Michigan). Retrieved from http://digitalcommons.mtu.edu/cgi/viewcontent.cgi?article=1164&context=etdr

Blake, M. (2004). Fraser Valley trade and prestige as seen from Scowlitz. In Prentiss, W. C., & Kuijt, I. *Complex hunter-gatherers: Evolution and organization of prehistoric communities on the plateau of northwestern North America*. Salt Lake City: University of Utah Press.

Blewett, W. L. (2009). *Understanding Ancient Shorelines in the National Parklands of the Great Lakes* (Pictured Rocks National Lakeshore Resource Report Series). *Washington, DC: National Park Service*.

Bornhorst, T. J., and W. I. Rose (1994). Self-guided geological field trip to the Keweenaw Peninsula, Michigan. *Proceedings of the Institute on Lake Superior Geology, Vol. 40, Part 2.*

Breckenridge, A. (2013). An analysis of the Late Glacial lake levels within the western Lake Superior basin based on digital elevation models. *Quaternary Research, 80*(3), 383-395.

Brown, J.A. (1983). Summary. In Phillips, J. L., & Brown, J. A. *Archaic hunters and gatherers in the American Midwest*. New York: Academic Press.

Carr, C., and D. T. Case (2006). *Gathering Hopewell: Society, ritual, and ritual interaction*. New York: Springer.

Carson, H. H. (1963). *Detail Map and Metal Detection Survey of the Aborigional Mine Pits, along the Minong Ridge at McCargoe Cove, Isle Royale National Park, Michigan*. On File: Isle Royale National Park, Houghton, MI.

Chapais, T. (1914). *The great intendant: A chronicle of Jean Talon in Canada, 1665-1672*. Toronto: Glasgow, Brook & Company.

Clark, C. P. (1995). *Archeological survey and testing at Isle Royale National Park, 1987-1990 seasons: Occasional Studies in Anthropology, No. 32*. Lincoln, Neb: U.S. National Park Service, Midwest Archeological Center.

Clark, C. (1999). *Late Prehistoric Cultural Affiliation Study, Grand Portage National Monument, Minnesota* (Cultural Resources Report No. 111). Archaeological Consulting Services, Ltd. Tempe, AZ.

Clark, C. P., and S. R. Martin (2005). A risky business: Late Woodland copper mining on Lake Superior. In P. Topping and M. J Lynott (Eds.), *The cultural landscape of prehistoric mines*. Oxford: Oxbow Books Limited.

Cochrane, T. (2009). *Minong-the good place: Ojibwe and Isle Royale*. East Lansing: Michigan State University Press.

Cooper, H. K., M. J. M. Duke, A. Simonetti, and G. C. Chen (January 01, 2008). Trace element and Pb isotope provenance analyses of native copper in northwestern North America: results of a recent pilot study using INAA, ICP-MS, and LA-MC-ICP-MS. *Journal of Archaeological Science*, 35(6):1732-1747.

Costain, T. B. (1970). *The white and the gold: The French regime in Canada*. Toronto: Doubleday.

Craddock, P. T. (1995). *Early metal mining and production*. Washington, D.C: Smithsonian Institution Press.

Davis, A.C. (1875/1961). Antiquities of Isle Royale, Lake Superior. In R. W. Drier and O. J. Du Temple (Eds.). *Prehistoric copper mining in the Lake Superior region: a collection of reference articles*. Calumet, MI: R.W. Drier.

DePasqual, S.C., and E. T. Pomber (2012). *Where's the Beach: Phase I Archaeological Testing of the Nipissing Shoreline.* Archaeological Survey Report. On File: Isle Royale National Park, Houghton, MI.

DePasqual, S. (2016) [Site monitoring reports covering Minong Mine and McCargoe Cove, 2010-2016, with accompanying GIS data]. Isle Royale National Park, Houghton, MI.

Dorr, J. A., and D. F. Eschman (1977). *Geology of Michigan*. Ann Arbor: University of Michigan Press.

Drier, R. W., and O. J. Du Temple (Eds.). (1961). *Prehistoric copper mining in the Lake Superior region: a collection of reference articles*. Calumet, MI: R.W. Drier.

Dustin, F. (1930). [Preliminary report on the archaeology of Isle Royale, Michigan, by Fred Dustin, special agent, Department of Anthropology, University of Michigan Museum, Ann Arbor, Mich]. Fred

Dustin Papers, 1807-1957, Clarke Historical Library (Box 5, Folder 2), Central Michigan University Libraries, Mount Pleasant, MI.

Esin, U. (1999). Copper objects from the Pre-Pottery Neolithic site of As¸ıklı (Kızıkaya Village, Province of Aksaray, Turkey) *Der Anschnitt* 9: 23–30.

Ferone, T. J. (1999). *Terminal woodland copper procurement strategies in the southern Lake Superior basin*. (Unpublished masters thesis). Michigan State University, East Lansing, MI.

Flakne, R. (2003). The Holocene vegetation history of Isle Royale National Park, Michigan, USA. *Canadian Journal of Forest Research*, *33*(6), 1144-1166.

Foster, J. W., and J. D. Whitney (1850). *Report on the geology and topography of a portion of the Lake Superior land district in the state of Michigan: Part 1: Copper Lands*. Washington: printed for the House of Reps.

Fox, G. R. (1911). The Ancient Copper Workings on Isle Royale. *The Wisconsin Archaeologist, 10*(2). 73-100.

Fox, W. A., R. G. Hancock, and L. A. Pavlish (1995). Where East met West: the new copper culture. *Wisconsin Archaeologist*, *76*(3-4), 269-93.

Fuller, G. N. (1928). *Geological reports of Douglass Houghton: First state geologist of Michigan, 1837-1845*. Lansing: Michigan Historical Commission.

Gallagher, J. M., and R. L. Josephs (2008). Using LiDAR to detect cultural resources in a forested environment: an example from Isle Royale National Park, Michigan, USA. *Archaeological Prospection*, *15*(3), 187-206.

Garfinkel, Y., F. Klimscha, S. Shalev, and D. Rosenberg (2014). The Beginning of Metallurgy in the Southern Levant: A Late 6th Millennium Cal BC Copper Awl from Tel Tsaf, Israel. *PloS one*, 9(3), e92591.

Gillman, H. (1873). Ancient Works at Isle Royale, Michigan. *Appletons' Journal: a magazine of general literature, science and art, 10*(229), 173-175.

Gillman, H. (1876). The Ancient Men of the Great Lakes. *Proceedings of the American Association for the Advancement of Science, Vol. 24*. Washington: American Association for the Advancement of Science.

Goad, S.I. (1979). Middle Woodland exchange in the prehistoric southeastern United States. In D> S. Brose and N. Greber (Eds.). Hopewell archaeology: The Chillicothe conference. Kent, OH: Kent State University Press.

Goad, S. I. (1980). Chemical analysis of native copper artifacts from the southeastern United States. *Current Anthropology*, *21*(2), 270-271.

Griffin, J. B. (1961). *Lake Superior copper and the Indians: miscellaneous studies of Great Lakes*

prehistory. Ann Arbor: University of Michigan.

Halsey, J. R. (1992). *Miskwabik -- red metal: The roles played by Michigan's copper in prehistoric North America*. Eagle Harbor, Mich.: Keweenaw County Historical Society.

Hautpmann A, J. Lutz, and E. Pernicka (1993). Zur Technologie der frühesten Kupferverhüttung im östlichen Mittelmeerraum. In Frangipane, M., & Palmieri, A. (1993). *Between the rivers and over the mountains: Archaeologica Anatolica et Mesopotamica Alba Palmieri dedicata*. Roma: Dipartimento di scienze storiche archeologiche e antropologiche dell'antichità, Università di Roma La Sapienza.

Hill, M. A. (2006). The duck lake site and implications for late archaic copper procurement and production in the Southern lake superior basin. *Midcontinental Journal of Archaeology*, *31*(2), 213-247.

Holmes, W. H. (1901). Aboriginal copper mines of Isle Royale, Lake Superior. *American Anthropologist*, 3(4), 684-696.

Holmes, W. H. (n.d.). [Sketch Map by William Henry Holmes of precontact mining pits and abandoned mine workings at Minong Ridge]. Record Unit 7084, William Henry Holmes Papers, 1870-1931, Smithsonian Institution Archives (Box 2, Folder 15), Washington, D.C.

Huber, N. K. (1973a). *The Portage Lake Volcanics (Middle Keweenawan) on Isle Royale, Michigan*. Washington: U.S. Govt. Print. Off.

Huber, N. K. (1973b). *Glacial and postglacial geologic history of Isle Royale National Park, Michigan*. Washington: U.S. Govt. Print. Off.

Hudson, E.W. (1883). Treasurer's report to the stockholders of the Minong Copper Co. from its organization to June 23, 1883. Detroit: Minong Copper Company.

Hunt, C. O., D. D. Gilbertson, and H. A. El-Rishi (2007). An 8000-year history of landscape, climate, and copper exploitation in the Middle East: the Wadi Faynan and the Wadi Dana National Reserve in southern Jordan. *Journal of Archaeological Science*, *34*(8), 1306-1338.

Isle Royale and Ohio Mining Company. (1846). [Articles of association of the Isle Royale and Ohio Mining Co.: with a description of their property]. Call number HD9539.C7 G85 1846, Martha W. Griffiths Rare Book Room, The Library of Michigan, Lansing, MI.

Ives, William D. S. (1855). [Field notes of the survey of Isle Royale T66N, R35W of the Michigan Meridian, in the State of Michigan]. On File: Isle Royale National Park, Houghton, MI.

Jackson, C. T. (1849). Report on the geological and mineralogical survey of the mineral lands of the United States in Michigan. In *Message from the President of the United States, to the two houses of Congress: at the commencement of the first session of the Thirty-first Congress. December 24, 1849. Read, and ordered to be printed, with the accompanying documents.* Washington: GPO.

Kiesow, D. L., C. Campetti, and S. DePasqual (2015). *2015 Relict Shoreline Survey and GIS Predictive Modeling.* Archaeological Survey Report. On File: Isle Royale National Park, Houghton, MI.

Krause, D. J. (1992). *The making of a mining district: Keweenaw native copper 1500-1870*. Detroit: Wayne State University Press.

Kuehn, S. R. (1998). New Evidence for Late Paleoindian-Early Archaic Subsistence Behavior in the Western Great Lakes. *American Antiquity*, *63*(3), 457-476.

Lankton, L. D. (1991). *Cradle to grave: Life, work, and death at the Lake Superior copper mines*. New York: Oxford University Press.

Lenihan, D. J. (1987). Submerged cultural resources study number 8: Isle Royale National Park. Santa Fe, NM: Submerged Cultural Resources Unit, National Park Service.

Levine, M.A. (1999). Native Copper in the Northeast: An Overview of potential sources available to indigenous peoples. In Levine, M. A., Sassaman, K. E., & Nassaney, M. S. *The archaeological Northeast*. Westport, Conn: Bergin & Garvey.

Levine, M. A. (2007a). Overcoming disciplinary solitude: the archaeology and geology of native copper in eastern North America. *Geoarchaeology*, *22*(1), 49-66.

Levine, M. A. (2007b). Determining the provenance of native copper artifacts from northeastern North America: Evidence from instrumental neutron activation analysis. *Journal of Archaeological Science*, *34*(4), 572-587.

Lidfors, K. (1988a). Quincy Mining Company Historic District. National Register of Historic Places Inventory/Nomination Form. Apostle Islands National Lakeshore, Bayfield, WI.

Lidfors, K. (1988b). Calumet Historic District. National Register of Historic Places Inventory/Nomination Form. Apostle Islands National Lakeshore, Bayfield, WI.

Lane, A. C. (1898). *Geological report on Isle Royale, Michigan*. Lansing: R. Smith Print. Co.

Maddin R., T. Stech, and J. D. Muhly (1991). Çayönü Tepesi: the earliest archaeological metal artefacts. In Mohen, J.-P., & Amis du Musée des Antiquités Nationales. *Découverte du métal*. Paris: Picard.

Martin, P.E. (1986). [Archaeological Field Notes]. Minong Mine Records (Box 14), MTU Industrial Archaeology Archives, Department of Social Sciences, Michigan Technological University, Houghton, MI.

Martin, S. R. (1999). *Wonderful Power: The Story of Ancient Copper Working in the Lake Superior Basin*. Detroit: Wayne State University Press.

Martin, P., S. R. Martin, and M. Gregory (1989). Technical report: 1987/1988 seasons, Isle Royale archaeology project. Unpublished report, Department of Social Sciences, Michigan Technological University, Houghton, MI.

Mason, J.Y. (1851). Leases of Mineral Lands on Isle Royale. In *H.R. Doc. No. 55, 31st Cong., 2nd Sess. (1851).*

Mason, R. J. (1981). *Great Lakes Archaeology*. New York: Academic Press.

McLuckie, J. (1977). Minong Mine Historic District. National Register of Historic Places Inventory/Nomination Form. Michigan State University, East Lansing, MI.

Minong Mining Company. (1875). *Prospectus of the Minong Mining Company*. Detroit: Daily Post Book and Job Printing Establishment.

Minong Mining Company. (1876). *Report of the directors to the stockholders: with reports from the agent and treasurer*. Detroit: Free Press Printing House.

Minong Mining Company. (1877). *Report of the directors to the stockholders: with reports from the agent and treasurer*. Detroit: Free Press Printing House.

National Park Service (2016, August 31). Nature. Website. https://www.nps.gov/isro/learn/nature/index.htm

North American Mineral Land Company. (1865). *Prospectus of the North American Mineral Land Company*. New York: J.J. Bloomfield.

Olson, S. J, and S. C. DePasqual (2016). *2016 Relict Shoreline Excavation*. Archaeological Survey Report. On File: Isle Royale National Park, Houghton, MI.

Pleger, T.C., and J. B. Stoltman (2009). The Archaic Tradition in Wisconsin. In Emerson, T. E., McElrath, D. L., & Fortier, A. C. (Eds.). *Archaic societies: diversity and complexity across the midcontinent*. Albany: SUNY Press.

Pompeani, D. P., M. B. Abbot, D. J. Bain, S. C. DePasqual, and M. S. Finkenbinder (2015). Copper Mining on Isle Royale 6500-5400 years ago identified using sediment geochemistry from McCargoe Cove, Lake Superior. *The Holocene*, *25*(2), 253–262.

Rakestraw, L. (1964). [Untitled report on Isle Royale archive/field investigations]. Minong Mine Records (Box 16), MTU Industrial Archaeology Archives, Department of Social Sciences, Michigan Technological University, Houghton, MI.

Rapp Jr., G., Henrickson, E., Miller, M., & Aschenbrenner, S. (1980). Trace-element fingerprinting as a guide to the geographic sources of native copper. *JOM*, *32*(1), 35-45.

Rapp, Jr., G., Henrickson, E., Allert, J. (1990). Native copper sources of artifact copper in pre-Columbian North America. In Lasca, N. P., & Donahue, J. (Eds.). *Archaeological Geology of North America*. Boulder, CO: Geological Society of America.

Rapp, Jr., G., J. Allert, V, Vitali, Z. Jing, and E, Henrickson (2000). *Determining geologic sources of artifact copper: Source characterization using trace element patterns*. Lanham, Md: University Press of America.

Rakestraw, L. (1965). *Historic mining on Isle Royale*. Houghton, MI: Isle Royale Natural History Association in cooperation with the National Park Service.

Rakestraw, L. (1967). Post Columbian History of Isle Royale Part I. Unpublished manuscript. Isle Royale National Park, Houghton, MI.

Rakestraw, L. (1968). *Commercial fishing on Isle Royale*. Houghton, MI: Isle Royale Natural History Association in cooperation with the National Park Service.

Root, R. L., and R. Douglass (1998). *"Time by Moments Steals Away": The 1848 Journal of Ruth Douglass*. Wayne State University Press.

Sassaman, Kenneth e. (2015). *Eastern Archaic, Historicized*. Lanham, MD: Rowman & Littlefield.

Shaw, C.G. (1847). [Diary, 1847-1849, commenting on weather, fishing and prospecting and mining operations on Isle Royale, Michigan.] Cornelius G. Shaw Papers, 1847-1849, Bentley Historical Library, University of Michigan, Ann Arbor, MI.

Siskowit Mining Company. (1850) *Charter and By-Law of the Siskowit Mining Company of Michigan, together with the treasurer's report, &c*. Philadelphia: John C. Clark.

Squier, E. G., and E. H. Davis (1848). *Ancient Monuments of the Mississippi Valley: comprising the results of extensive original surveys and explorations* (Vol. 1). Washington: Smithsonian Institution.

Stoltman, J. B. (1986). Archaic Tradition. In William Green, James B. Stoltman, and Alice B. Kehoe, Editors, Introduction To Wisconsin Archaeology: Background For Cultural Resource Planning. *Wisconsin Archeologist*, *67*(3-4), 207-238.

Stroh, M.H. (2014). *The Grace Peninsula Site (20.IR.239): An Archaic Copper and Lithic Manufacturing Site on Isle Royale National Park.* M.S. Thesis. St. Cloud State University.

Swineford, A.P. (1876). *History and Review of Copper, Iron, Silver, Slate and Other Material Interests of the South Shore of Lake Superior*. Marquette, MI: The Mining Journal.

The Engineering and Mining Journal. (1884) General Mining News: Michigan. *The Engineering and Mining Journal*, 37(25), 469.

Trepal, D. J., and P. E. Martin (2015). Interim Report: National Historic Landmark Nomination: Minong Mine, Isle Royale National Park (20.IR.0024) Keweenaw County, Michigan. Unpublished report, Department of Social Sciences, Michigan Technological University, Houghton, MI.

Trepal, D. J. (2015). [Archaeological field notes of the 2015 archaeological survey at Minong Ridge]. MTU Industrial Archaeology Archives, Department of Social Sciences, Michigan Technological University, Houghton, MI.

U.S. House of Representatives. *The Executive Documents: Thirty First Congress, Second Session, Volume 7, part 2*. GPO: Washington, D.C. pp. 1787-1794.

Walder, Heather (2015). "…A Thousand Beads to Each Nation:" Exchange, Interactions, and Technological Practices in the Upper Great Lakes c. 1630-1730. PhD. Dissertation, Department of

Anthropology, University of Wisconsin-Madison.

Whittlesey, Charles. (1848). [Report of Charles Whittlesey, Agent, to the President and Directors 1848]. MS-048 (Box 12, Folder 17) Michigan Technological University Archives, Michigan Technological University, Houghton, MI.

Whittlesey, C. (1852). Descriptions of ancient works in Ohio. *Smithsonian Contributions to Knowledge, 3*(7), 1-20. Washington: Smithsonian institution.

Whittlesey, C. (1854/1961). Ancient mining on the shores of Lake Superior. In Drier, R. W., & Du Temple, O. J. (Eds.). *Prehistoric copper mining in the Lake Superior region: a collection of reference articles*. Calumet, MI: R.W. Drier.

Whittlesey, C. (1863). Ancient mining on the shores of Lake Superior. *Smithsonian Contributions to Knowledge, 13(4),* 1-32. Washington: Smithsonian Institution.

Wilson, D. (1856). The ancient miners of Lake Superior. *The Canadian journal of industry, science and art*, *1*(3), 225-237.

Winchell, N. H. (1881). Ancient copper mines of Isle Royale. *Popular Science Monthly*, 19, 601-620.

Wittry, W. L. (1957). A Preliminary Study of the Old Copper Complex. *Wisconsin Archeologist*, *32*(1), 1-18.

Wood, A. B. (1907). On the ancient copper-mines of Lake Superior. *Transactions of the American Institute of Mining Engineers, Containing the Papers and Discussions of 1906,* 37. 288-296

Previous documentation on file (NPS):

x Previously listed in the National Register (fill in 1 through 6 below)
__ Not previously listed in the National Register (fill in **only** 4, 5, and 6 below)

1. NR #: 77000153
2. Date of listing: 11/11/77
3. Level of significance:
4. Applicable National Register Criteria: A X_ B__ C__ D X_
5. Criteria Considerations (Exceptions): A__ B__ C__ D__ E__ F__ G__
6. Areas of Significance: Archeology – Prehistoric; Archeology – historic; Industry

__ Previously Determined Eligible for the National Register: Date of determination:
__ Designated a National Historic Landmark: Date of designation:
__ Recorded by Historic American Buildings Survey: HABS No.
__ Recorded by Historic American Engineering Record: HAER No.
__ Recorded by Historic American Landscapes Survey: HALS No.

Location of additional data:

State Historic Preservation Office: Michigan State Historic Preservation Office
Other State Agency:
Federal Agency: National Park Service (Isle Royale National Park, Midwest Archeological Center)
Local Government:
University: Michigan Technological University
Other (Specify Repository):

8. FORM PREPARED BY

Name/Title: Dan Trepal

Address: Department of Social Sciences
1400 Townsend Drive
Houghton, MI 43391

Telephone: (906) 487-1465

E-mail: djtrepal@mtu,edu

Date: February 10, 2017

Edited by: Dr. Vergil E. Noble
National Park Service
Midwest Archeological Center
Federal Bldg, Room 474
100 Centennial Mall North
Lincoln, NE 68508

Telephone: (402) 437-5392 x 108

Dr. Michael P. Roller
National Park Service
National Historic Landmarks Program
1849 C St., NW - Mail Stop 7508
Washington, DC 20240

Telephone: (202) 354-2125

Photograph Information

List of Photos and Photo Identification Information

Name of Property: Minong Copper Mining District (20.IR.24)
County and State: Keweenaw County, Michigan
Name of Photographer: Seth DePasqual, Isle Royale National Park
Photograph Date: 2009-2015
Location of Photographs: Isle Royale NP, Cultural Resource Program

Photo Number	Description of Figure/Photo	Camera Angle
1	Overview of precontact mining pit cluster landscape below Minong Ridge, 2015.	SE
2	Hammerstone detail and precontact mining trench in background, 2012.	N
3	Minong Mining Company Tramway remains, 2009.	N

Photo Log

Ink and Paper Combination: **UltraChrome HD Pigment Inks** on **Moab Juniper Baryta Rag Glossy Fine Art Inkjet Print Paper** using an **Epson SureColor P600** printer

Photo 0001: Precontact mining pit cluster below Minong Ridge
Name of Property: Minong Copper Mining District (20.IR.24)
County and State: Keweenaw County, Michigan
Name of Photographer: Seth DePasqual
Photograph Date: July 13, 2015
Location of Original Photograph: Isle Royale NP, Cultural Resource Program
Image File Name: MI_Keweenaw County_Minong Copper Mining Dist_001.tif

Photo 0002: Hammerstone detail and precontact mining trench in background
Name of Property: Minong Copper Mining District (20.IR.24)
County and State: Keweenaw County, Michigan
Name of Photographer: Seth DePasqual
Photograph Date: June 20, 2012
Location of Original Photograph: Isle Royale NP, Cultural Resource Program
Image File Name: MI_Keweenaw County_Minong Copper Mining Dist_002.tif

Photo 0003: Minong Mining Company Tramway remains
Name of Property: Minong Copper Mining District (20.IR.24)
County and State: Keweenaw County, Michigan
Name of Photographer: Seth DePasqual
Photograph Date: July 4, 2009
Location of Original Photograph: Isle Royale NP, Cultural Resource Program
Image File Name: MI_Keweenaw County_Minong Copper Mining Dist_003.tif

Figures

Figure Number	Description of Figure
1	Map (USGS) showing the location of the Minong Copper Mining District within Isle Royale National Park.
2	Map showing the location of the boundary coordinates of the Minong Copper Mining District.
3	Map showing Minong Copper Mining District Boundary and primary historic features.
4	Map showing Precontact Pit Density in context with historic mine activities.
5	Map: William Holmes' ca. 1890's sketch map overly of Minong landscape showing precontact and historic mine activities. Sketch map courtesy of Smithsonian Institution Archives. Used with permission.
6	Photo by William Henry Holmes ca. 1890s showing a precontact mining pit on Minong Ridge. Image courtesy of National Anthropological Archives, Smithsonian Institution. Used with permission.
7	Photo by William Henry Holmes ca. 1890s showing the profile of an excavated precontact mining pit on Minong Ridge. Image courtesy of National Anthropological Archives, Smithsonian Institution. Used with permission.
8	Photo by William Henry Holmes ca. 1890s showing the landscape of Minong Ridge. Image courtesy of National Anthropological Archives, Smithsonian Institution. Used with permission.
9	Photo: Ruins of the Minong Mining Company shaft house in 1909. William S. Cooper Collection, Isle Royale National Park Archives.
10	Photo: Ruins of Minong Mining Company blacksmith shop building ca. 1930s. Fred Dustin Collection, Isle Royale National Park Archives.
11	Photo: Minong Mining Company Tipple ruins, ca. 1929. Fred Dustin Collection, Isle Royale National Park Archives.
12	Photo: Minong Mining Company dam remains ca. 1964. Isle Royale National Park Archives.
13	Photo: A crew member engages in experimental archaeology during Tyler Bastian's 1962 fieldwork at Minong Ridge. Isle Royale National Park Archives.
14	Photo: Aerial view of historic Minong Mining Company workings ca. 1962, taken during Tyler Bastian's fieldwork at Minong Ridge. Isle Royale National Park Archives.
15	Photo from Minong Ridge by Tyler Bastian showing the general appearance of the precontact mining pit cluster landscape in 1962. Isle Royale National Park Archives.
16	Photo: The general appearance of the precontact mining pit cluster landscape today (2015). Seth DePasqual, Isle Royale NP - Cultural Resource Program
17	Photo: Minong Mining Company tramway as it appeared ca. 1962. Bill Deephouse Collection, Isle Royale National Park Archives.
18	Photo: The Minong Mining Company Tramway remains as they appear today (2009). Seth DePasqual, Isle Royale NP - Cultural Resource Program
19	Photo: Double-Cabin ruins as photographed ca. 1920s. Farmer Collection, Isle Royale National Park Archives.
20	Photo: Hammerstone found beside precontact mining trench on Minong Ridge (2012). Seth DePasqual, Isle Royale NP - Cultural Resource Program

National Historic Landmarks

Property Name: **Minong Copper Mining District**

PAGES REMOVED

Figure Number: 1-5

Some information about this property is restricted under law:

National Historic Preservation Act of 1966, as amended, section 304, 16 U.S.C. 470w-3(a)
- *Confidentiality of the location of sensitive historic resources*

Section 304

[16 U.S.C. 470w-3(a) – Confidentiality of the location of sensitive historic resources]
(a) The head of a Federal agency or other public official receiving grant assistance pursuant to this Act, after consultation with the Secretary, shall withhold from disclosure to the public, information about the location, character, or ownership of a historic resource if the Secretary and the agency determine that disclosure may –
(1) cause a significant invasion of privacy;
(2) risk harm to the historic resources; or
(3) impede the use of a traditional religious site by practitioners.

Figure 6: Photo taken by William Henry Holmes in 1892 showing a precontact mining pit on Minong Ridge, partially disturbed by Minong Minong Company workings, which Holmes excavated. View to the north. Courtesy of National Anthropological Archives, Smithsonian Institution, Michigan Archaeology Negatives - Photo Lot 14, Image 2281. Used with permission.

Figure 7: Photo taken by William Henry Holmes in 1892 showing the profile of an excavated precontact mining pit on Minong Ridge. Note the hammerstones pile in the foreground. Courtesy of National Anthropological Archives, Smithsonian Institution, Michigan Archaeology Negatives - Photo Lot 14, Image 2273. Used with permission.

Figure 8: Photo taken by William Henry Holmes in 1892, showing the landscape of Minong Ridge. Note the charred tree stumps in the foreground, evidence of the 1885 fire that burned much of Minong Ridge. Hammerstones are visible in the foreground. View to the northeast. Courtesy of National Anthropological Archives, Smithsonian Institution, Michigan Archaeology Negatives - Photo Lot 14, Image 2292. Used with permission.

Figure 9: Ruins of the Minong Mining Company shaft house in 1909. View to the northwest. William S. Cooper Collection, Isle Royale National Park Archives.

Figure 10: Ruins of Minong Mining Company blacksmith shop building ca. 1930s. View to the northeast. Fred Dustin Collection, Isle Royale National Park Archives.

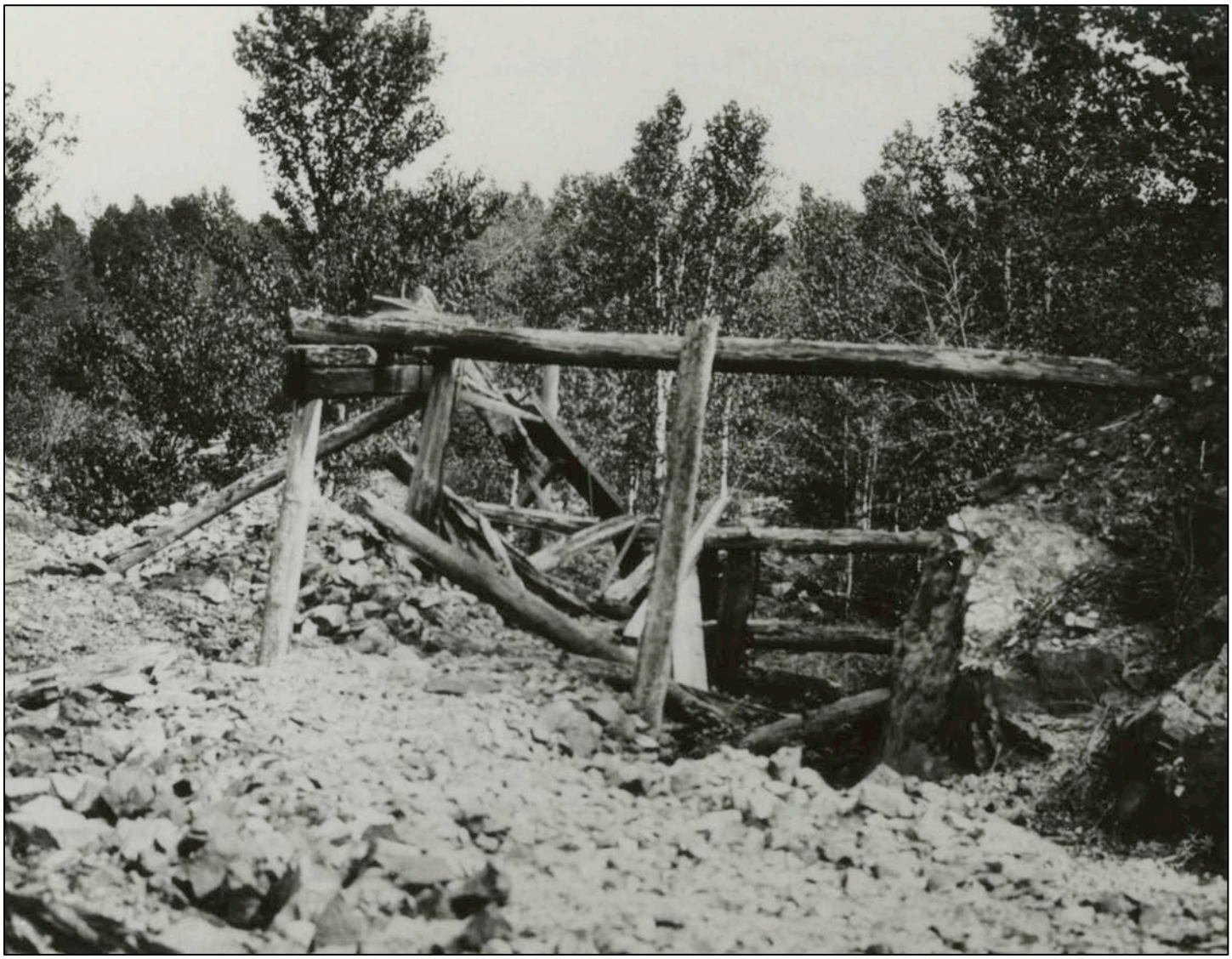

Figure 11: Minong Mining Company Tipple ruins, ca. 1929. Fred Dustin Collection, Isle Royale National Park Archives.

Figure 12: Minong Mining Company dam remains, 1964. View to the southwest. NVIC Collection, Isle Royale National Park Archives.

Figure 13: A crew member engages in experimental archaeology during Tyler Bastian's 1962 fieldwork at Minong Ridge. Tyler Bastian Collection, Isle Royale National Park Archives.

Figure 14: Aerial view of historic Minong Mining Company workings ca. 1962, taken during Tyler Bastian's fieldwork at Minong Ridge. The remains of the main workings and spoil piles of the Minong Mining Company are just visible to the left, and the tramway remains run across the center of the photo. View to the north. Tyler Bastian Collection, Isle Royale National Park Archives.

Figure 15: Photo from Minong Ridge by Tyler Bastian showing the general appearance of the precontact mining pit cluster landscape in 1962. Each field crew member stood in the center of a precontact mining pit. View to the northwest. Tyler Bastian Collection, Isle Royale National Park Archives.

Figure 16: The general appearance of the precontact mining pit cluster landscape today (2015). While not in the same location as Photo 10, this photo was composed similarly, with each person positioned in the center of a precontact mining pit. View to the southeast. Seth DePasqual, Isle Royale National Park.

Figure 17: A photo of the Minong Mining Company tramway as it appeared ca. 1962. Photo taken facing west towards the main Minong Mining Company workings (obscured by vegetation). View to the southwest. Bill Deephouse Collection. Isle Royale National Park Archives.

Figure 18: The Minong Mining Company Tramway remains as they appear today (2009). Photo facing northeast, towards McCargoe Cove. Seth DePasqual, Isle Royale National Park.

Figure 19: Double-Cabin ruins as photographed ca. 1920s. The cabin was associated with historic mine activities on north side of Minong Ridge near east end of Minong Copper Mining District. View to the north. Farmer Collection, Isle Royale National Park Archives.

Figure 20: Hammerstone found beside precontact mining trench on Minong Ridge, 2012. View to the north. Seth DePasqual, Isle Royale National Park.