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ORIGINAL ARTICLE

Sucreries and *Ziizbaakdokaanan*: Racialization, Indigenous Creolization, and the Archaeology of Maple-Sugar Camps in Northern Michigan

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Abstract Comparison of the remains on four northern Michigan archaeological sites with ethnohistorical accounts of maple sugaring confirms the function of these sites, occupied between the late 18th and late 19th centuries. All include charcoal deposits and artifacts associated with open-fire sap boiling in kettles, and three sites are notable for faunal remains dominated by fish and essentially without large mammals, wild or domestic. The sites' archaeological characteristics contradict historical accounts that used racial terms, such as "Indian," "white," and "half-breed," to differentiate sugar makers and racialize both their practices and products. Instead, archaeological and historical evidence of sugaring can be explained by a process called "indigenous creolization." This concept facilitates the balanced recognition of Native American (mainly Anishinaabe) and European (mainly French Canadian) influences on maple sugaring without reproducing colonial classifications based on race or racialized ethnicity.

Extracto La comparación de los restos en cuatro yacimientos arqueológicos del norte de Michigan con informes etnohistóricos de la obtención de azúcar de arce confirma la función de estos yacimientos, ocupados entre finales del siglo XVIII y finales del siglo XIX. Todos incluyen depósitos de carbón vegetal y objetos asociados a la cocción de savia en fogatas en calderas, y tres yacimientos son notables por restos de fauna dominados por peces y esencialmente sin grandes mamíferos, salvajes o domésticos. Las características arqueológicas de los yacimientos contradicen los informes históricos que utilizaban términos raciales, tales como "indio", "blanco", y "mestizo" para diferenciar a los fabricantes de azúcar y racializar tanto sus prácticas como sus productos. En cambio, las pruebas arqueológicas e históricas de la obtención de azúcar pueden explicarse mediante un proceso denominado "creolización indígena". Este concepto facilita el reconocimiento equilibrado de las influencias de los nativos americanos (principalmente Anishinaabe) y de los europeos (principalmente, franco canadienses) en la obtención del azúcar sin reproducir clasificaciones coloniales basadas en la raza o en la etnicidad racializada.

Résumé Une comparaison entre les vestiges sur quatre sites archéologiques du nord du Michigan et les récits ethno-historiques sur le sucre d'érable confirme la fonction de ces sites, occupés entre la fin du 18e siècle et la fin du 19e siècle. Tous comprennent des dépôts de charbon et des artefacts liés à la sève sur le feu bouillonnant dans les bouilloires, et trois sites sont remarquables pour les restes de la faune, dominés par les poissons et essentiellement sans grands mammifères

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sauvages ou domestiques. Les caractéristiques archéologiques des sites contredisent les récits historiques qui utilisent des termes raciaux, tels que « indien », « blanc » et « demi-race », afin de différencier les producteurs de sucre et de racialiser leurs pratiques et leurs produits. Au lieu de cela, des preuves archéologiques et historiques du sucrage peuvent être expliquées par un processus appelé « créolisation autochtone ». Ce concept facilite la reconnaissance équilibrée des influences indigènes américaines (principalement les Anishinaabe) et européennes (principalement franco-canadiennes) sur le sirop d'érable sans reproduire les classifications coloniales basées sur la race ou l'origine ethnique raciale.

Keywords maple sugar · creolization · Michilimackinac · Straits of Mackinac · Gros Cap · Pointe Aux Chenes · Anishinaabe · French Canadian

Introduction

In 1962, the journal *Ethnohistory* published what may be the first explicitly archaeological discussion of maple sugaring in the Great Lakes area (Quimby 1962). Based on Alexander Henry's description of sugaring by a Chippewa extended family in 1764 (Bain 1901), George I. Quimby (1962:177–178) predicted the archaeological remains that would be found at sugar-camp locations. This discussion was widely read after it was included in Quimby's (1966:160–180) classic *Indian Culture and European Trade Goods*, which was called "a landmark in North American historical archaeology" (Kidd 1968:256). Unfortunately, over the ensuing decades this model was not formally tested at post-European sites, but researchers cited Henry's account (Bain 1901) during an extended debate concerning whether archaeological evidence exists in the Great Lakes region for Native American sugaring prior to the arrival of Europeans (Holman 1984; Holman and Egan 1985; Mason 1985; Mason and Holman 2000). To some extent, this focus on possible origins may have temporarily diverted attention from the archaeological significance of colonial period maple-sugaring sites in the Great Lakes region. The small amount of archaeological data currently available on sugaring is derived largely from observations of surface features, and excavation has been limited to relatively recent (after ca. 1850) production sites that utilized flat pans and enclosed hearth features called "arches," rather than the earlier technology of boiling sap in kettles over an open fire (Dunham and Branstner 1995; Thomas 2001, 2005; Keener et al. 2010; Babson 2011). Subsurface investigations at open-fire boiling sites are necessary in order to advance understanding of this process.

In 2010–2012, U.S. Forest Service archaeologists investigated four sites in Mackinac County, Michigan, that appear to be sugar camps where open-fire sap reduction took place. These sites were found during archaeological monitoring of two areas in the Hiawatha National Forest where sugar maples (*Acer saccharum*) were abundant at the time of the General Land Office surveys in the mid-19th century (Comer et al. 1994). They are located near the north shore of Lake Michigan and west of the Mackinac Straits (Fig. 1). Based on diagnostic artifacts, two of these sites date to the late 18th or early 19th century (20MK484, 20MK485), one to ca. 1825–1850 (20MK510), and one to ca. 1850–1900 (20MK523). Archaeological sites like these document the practice of open-fire boiling as it developed during colonial era interaction between Native Americans and Europeans within the northern Great Lakes section of the Laurentian Mixed-Forest Province (Albert 1995). During this period, many residents of the Mackinac Straits spoke both French and Anishinaabemowin (Ojibwe or Ottawa), and would have referred to sugar camps as both *sucreries* and *ziizbaakdokaanan* (Dunn 1880; Johnston 1978; Baraga 1992; Murphy 2014; Naokwegijig-Corbiere and Valentine 2016).

Investigations were designed to (1) confirm identification of the four sites as sugar camps, based on Quimby's (1962:177–178) predictions that sites would include "bones of fish, migrating fowl, and small animals," and "extensive hearth remains"; (2) compare archaeological findings with other ethnohistorical and environmental information to gain a better understanding of 18th- and 19th-century maple sugaring; and (3) consider how the material remains of sugar camps might address racial and ethnic categorizations of people during the Great Lakes fur-trade era. Other researchers beside Quimby (1962) predicted what archaeological remains of sugar camps might look like. For example, Holman (1984:80) suggested that sugar camps should be relatively small sites located near larger and more permanent settlements, like summer villages, and concluded that "perhaps the best clues for distinguishing a sugaring site are sparse food remains, particularly of

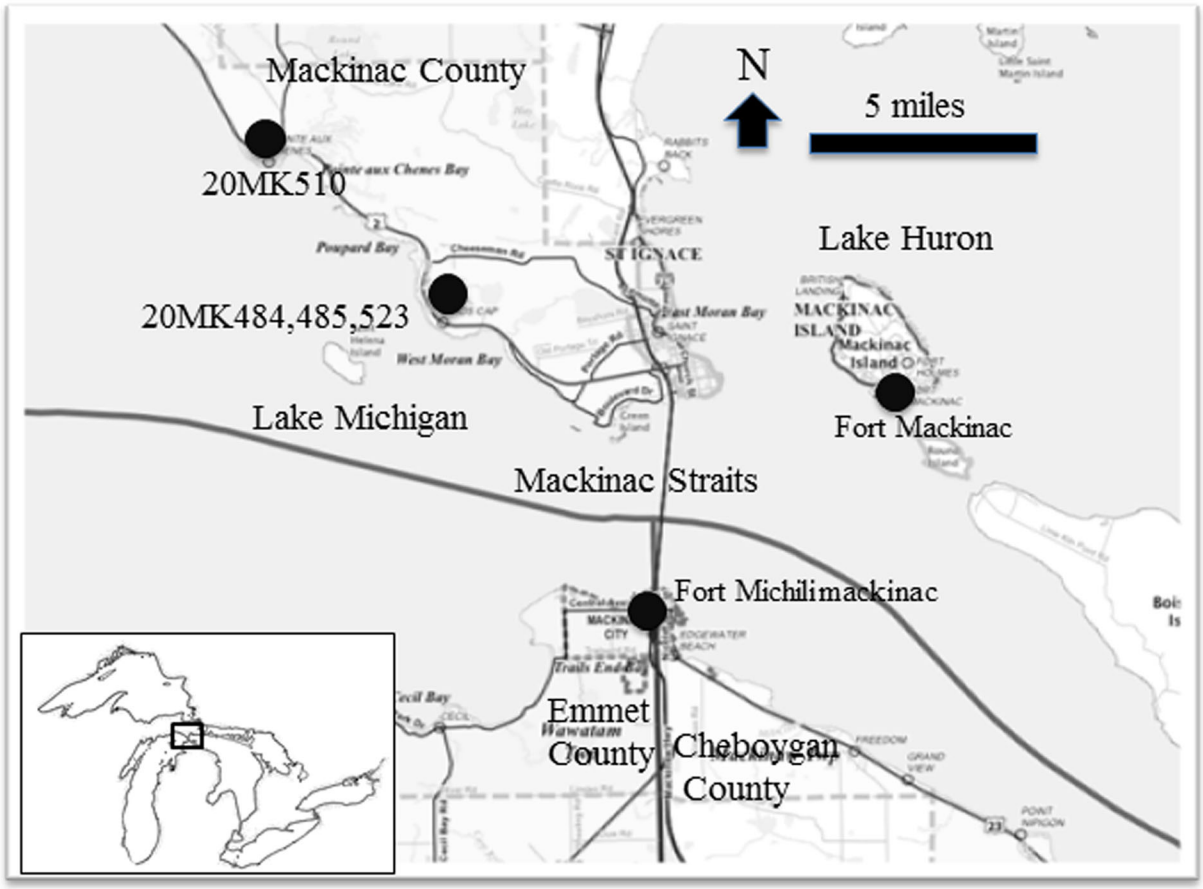

Fig. 1 Site location map. (Drawing by John G. Franzen, 2015; base maps courtesy State of Michigan, Geographic Data Library <http://www.mcgi.state.mi.us/mgdl>.)

large mammals, and relatively fewer artifacts associated with hunting and fishing."

Racialization and Maple Sugaring

Hennepin (1969:147) mentions maple sugar in his 17th-century description of the Great Lakes region, and during the 18th and 19th centuries it became part of the fur-trade economy (McKenney 1827:149; Schoolcraft 1851:162; Porteous 1938:13–14). Regardless of how the practice first developed, during this period observers described almost all sugar makers as Indians, French Canadians, or "half-breeds." Following the British occupation of the area in 1761, increasingly rigid "racial distinctions" altered political, social, and economic relationships to favor British interests, including the racialization of French Canadians and "mixed bloods" as non-White (Scott 2001). This trend continued after the United States took control of the area in the 19th century. For example, Disturnell (1875:131) described the population of Gros Cap, an agricultural and fishing settlement adjacent to three of the sites discussed in this article, as about 100 "whites, half-breeds, and Indians." In 18th- and 19th-century accounts that describe Great Lakes maple sugaring, many writers categorized producers as either Indians or French Canadians (McKenney 1827:192; Schoolcraft 1851:162; Childs 1859:161,175; Ellis 1876:222; Porteous 1938:13–14; Gates 1965:32). Other observers included a third term (usually "half-breed") to distinguish sugar makers who appeared to have both European and Native American ancestry (Morse 1822:50; L. Wheeler 1844:1; Whittlesey 1852:431).

Besides describing sugar makers in racial terms, British and Anglo-American writers racialized the practices and material characteristics of maple sugaring. In a 1767 account linking race and sugar quality, a British visitor to the Straits of Mackinac pointed out that, although the "Indians" made an "abundance of it everywhere," their maple sugar was not as "clean" or "fine" as that made by the "French" (Porteous 1938:12). Leonard H. Wheeler (1844) describes ca. 1840s sugaring by "Indians, French, and halfbreeds" in northern Wisconsin, contrasting the sugar, made on a "rather large scale" and in a "systematic manner" by his hired man Robert, as "white as the nicest brown sugar and very clear," with that made by "the Indians," which had a "darker hue" resulting from "sticks, soot, dirt, and all." In recalling 19th-century sugaring in the Green Bay area, Ellis (1876:221) mentions that a "better class of the French ... attained great perfection in the purifying process" and describes their sugar as "quite fair and pure." He adds that some even increased their production by purchasing and purifying syrup and "coarse" sugar from "their Indian retainers, and their less able neighbors" (Ellis 1876:221).

An account from a northern Wisconsin sugar maker illustrates the complex dynamics of racialization. In what her editor calls a "Metis Autobiography," Eliza Morrison, who made maple sugar during the mid-19th century, describes her sugar as "much whiter and cleaner" than that made by "Indians," but she describes her method of sugaring as "the old Indian way" (Brehm 2002:62–65). Mrs. Morrison, listed as "mixed blood" in 1837 treaty documents, considered herself French, Scots, and Chippewa, and was labeled as "Indian" on her death certificate (Brehm 2002:20,150). Her account reveals the pervasiveness of racialization and how an individual could both accommodate and resist the process. Over time, racializing narratives increasingly emphasized technological attributes of sugaring. Observers ca. 1900 criticized the "primitive" equipment, "antiquated" methods, and the supposedly inferior products made by what they called "backward" groups who still conducted open-fire boiling (Gilfillan 1901:71; Spencer 1913:9–11).

Even though they may have been considered "whiter" than Indians, tropes based on sugar were also used to racially define French Canadians. During the early 19th century, Englishman John Lambert (1813:83) observed that maple sugar in Lower Canada was "dark brown" because people of French ancestry did not "trouble themselves" with refining it, while English speakers in Upper Canada made it "very white." Edmund Ely, a Protestant missionary from New England working in northern Wisconsin in 1834, cited their love of sugar as an example of "the beastly sensuality" of French Canadians, and he criticized both the French and Indians for making sugar on the Sabbath (Schenk 2012:97,190). Clearly, the perception of maple sugaring was affected by the 19th-century obsession with "whiteness" and associated metaphors linking sugar to ideas about purity and race (Errington et al. 2004:63; Knight 2007). Racialization of sugar would have had a negative economic effect on "non-White" producers. The irony of parsing racial or cultural identity relative to sugar color is that producers, supposedly of different races, may have utilized the same sugaring practices (Scott 1991:45). Regardless of how they were categorized by observers, the most detailed accounts clearly indicate that 18th- and 19th-century sugaring in this region included practices derived from both European and Native American traditions (Bain 1901; Baird 1998; Corp [2009]). However, referring to this process of cultural development using terms like blending or mixture fails to acknowledge the significance of colonialism and racism during this period.

For several decades, archaeologists studying cultural change in colonial settings have experimented with more nuanced terms, such as acculturation, creolization, hybridization, *mestizaje*, and ethnogenesis (Dawdy 2000; Ferguson 2000; Card 2013; Liebmann 2013; van Pelt 2013; Lightfoot 2015). Critiques of these concepts point out their various strengths and weaknesses, but to some extent they all include what Card (2013:1) calls "undesired connotations," which, if not used carefully, can produce overgeneralized, overdetermined, or essentialized categorizations (Palmié 2006, 2013; Khan 2007; Pappa 2013; Silliman 2013, 2015; Lightfoot 2015; Voss 2015). Even advocates for particular approaches avoid claims of universality and argue for more reflexive and restrictive use of these terms (Liebmann 2013:30, 2015:24; Voss 2015:655–656). Additionally, Pappa (2013:38) argues that the search for an optimal term is futile, and that extended semantic discussions are diverting too much attention from archaeological phenomena.

"Creolization" is probably the term most often used by late 20th- and early 21st-century archaeologists in reference to "cultural mixture" (Liebmann 2013:28). However, Van Valkenburgh (2013) documents how quickly these concepts rise and fall in archaeological popularity, supporting Pappa's (2013) diagnosis of a collective preoccupation with semantic trends. Given its continued use in cultural anthropology and related disciplines, perhaps this term is still useful. Because of its focus on the cultural dynamics of subaltern groups in colonial settings characterized by asymmetric power relations, it appears well suited for discussing the archaeology of sugar camps. During the 17th, 18th, and 19th centuries Great Lakes maple sugaring took place under the influence of successive colonization efforts by France, Great Britain, and the United States. Trade as well as kinship directly linked sugar camps to multiethnic fur-trade communities (primarily of Native American and French ancestry) that originated prior to British and American political domination of the region (Murphy 2014:17–18).

However, Palmié (2006, 2007) criticizes the unreflexive use of "creole metaphorics" in studying colonial settings outside the Caribbean and the resulting decontextualization and depoliticization of the term. Although recent archaeological interest has focused on concepts like hybridity and ethnogenesis, researchers in other disciplines have been addressing these concerns (Van Valkenburgh 2013). For example, Lionnet and Shi (2011:1,23) cautioned that, although it appears "across a wide range of cultural formations," creolization should still be understood as "historically, contextually, and regionally specific." Reflexive approaches have successfully recontextualized and repoliticized this concept for use in different settings (Munasinghe 2006; Knörr 2010; Halbmayer 2013; Halbmayer and Alés 2013). This includes "distinguishing between creole as a proper noun and creolization as practice" and reconciling analytic terminology with information on self-ascribed identities (Diaz 2006:576–577). However, uncritical use of these terms can still lead to "overdetermined" categorization, and various critiques advise focusing on "practices and performances" (Silliman 2015:16), "everyday expression" (Khan 2007:238), and "technical description of the realities of creolization" (Chancé 2011:267).

With respect to Great Lakes sugar camps, applying the concept of "indigenous creolization" helps address these concerns and also responds to calls for better understanding of cultural persistence among native peoples during colonial times (Halbmayer and Alés 2013; Panich 2013; Lightfoot 2015). This term was inspired by colonized groups that maintain indigenous identities while adapting to very high rates of change, and it facilitates balanced consideration of continuities as well as innovations (Halbmayer 2013; Halbmayer and Alés 2013). It highlights how indigeneity could be "rearticulated" during contact with "non-indigenous power structures, knowledge, tools, and technologies," and emphasizes that creolization does not always result in creoles (Halbmayer 2013:66). Despite his criticism, Palmié (2006:447) acknowledges "the genie is out of the bottle," and that widespread use of the "C word" in anthropology and related fields shows no sign of abating. This archaeological study of sugar camps continues exploring the heuristic potential of this concept.

Historical Context of Maple-Sugar Production

In a broad sense, fur-trade era maple-sugar production in northern Michigan was part of the global expansion of industrial capitalism and concomitant increases in per capita sugar consumption (mainly derived from sugarcane) in industrialized countries, especially England and the United States (Mintz 1986). Cheap calories from sugar (enabled by colonialism and the use of slaves) helped feed rapidly expanding urban populations. Sugar consumption in Britain increased some 2,500% ca. 1650–1800 (Mintz 1986:73). The magnitude of increases in the U.S. is also striking: in 1822 a population of 10.3 million consumed 9.5 lb. per capita, and in 1860 31.4 million people consumed 32.6 lb. per capita (Polopolus and Alvarez 1991:8). In the early 19th century maple sugar cost about half as much as cane sugar produced on West Indian plantations and was promoted as a way to oppose slavery and increase North American self-sufficiency (Nearing and Nearing 2000:63–64, 247; Theobald 2012:2). Maple-sugar production peaked in the mid-19th century, and by that time most commercial European American producers were abandoning open-fire boiling in favor of flat pans placed on enclosed hearth structures called "arches" (Fox et al. 1905:7). After the cost of cane sugar fell below that of maple sugar in the 1880s, commercial maple products became

specialty items no longer in direct competition with cane or beet sugar, and syrup soon replaced sugar as the predominant maple sweetener (Hubbard 1906; Nearing and Nearing 2000:64).

Historical documents from the 18th and 19th centuries illustrate the importance of maple sugar as a trade item in the Upper Great Lakes, and a 1767 account describes “sugaries” located near Fort Michilimackinac (Fig. 1) (McKenney 1827:149; Schoolcraft 1851:162; Porteous 1938:13–14). According to Schoolcraft (1855:708), seven northern Michigan Ottawa bands consisting of approximately 700 people produced 325,000 lb. in one season. In addition, a merchant on St. Joseph Island (40 mi. northeast of the Mackinac Straits) shipped 1,000,000 lb. to Detroit and Chicago in 1839, bringing in $75,000 (Bayliss and Bayliss 1938:98–101). Schoolcraft (1851:162–163) described a large northern Michigan sugar camp in 1823: "The whole air of the place resembled that of a manufactory." Given the scale and duration of maple sugaring as reported in historical documents, contemporary Great Lakes archaeological inventories and literature grossly neglect this topic. Unfortunately, this may have played a role in the failure to adequately recognize the contributions of Native American traditions to the broader cultural heritage and economy of the United States (Vogel 1987).

Women directed sugar production during the 18th and 19th centuries (Monk 1807; McKenney 1827:193; Bain 1901:70; Gilfillan 1901:70–71; Gates 1965:32; Warren 1984:263–264). Activities of males varied, but besides assisting in sugaring and cutting firewood, most accounts mention some combination of fishing, hunting, or trapping (Monk 1807; Gilfillan 1901:70–71; Warren 1984:263–264). This strategy accommodated both environmental and socioeconomic variation. For example, a 19th-century Minnesota missionary described extended families separating into camps for sugaring (mainly women) and muskrat hunting (mainly men) when both of these resources were desired by traders and were simultaneously available in areas too far apart to be exploited from a single camp location (Pond 2002:53–56). A description of open-fire boiling at Gros Cap ca. 1874 mentions sugar-camp subsistence, such as potatoes boiled in sap and men leaving the sugar camp to “spear or hook trout to replenish the larders” (Corp [2009]). In addition, Corp ([2009]) recalled suspending kettles over fires on chains, storing sap in "whiskey barrels, pork barrels, and troughs dug out of large maples," and using birch-bark containers for sap collection and sugar storage.

Maple sugar was more than a commodity for exchange. Producers consumed it as both a year-round seasoning and a significant calorie source during late winter or early spring food shortages (Bain 1901:70; H. Smith 1932; Kohl 1985:319; Schenk 2012:82). Sugaring also played a role in social reproduction. Although usually occupied by groups no larger than an extended family, camps were often close enough together to facilitate frequent interaction. Traveling on foot, missionary Edmund Ely was able to visit seven sugar camps in northern Wisconsin on 20 March 1841 and at least eight on 22 March 1841. He noted that two were only 1 mi. apart, and he received gifts of sugar at four (Schenk 2012:348). First-fruits ceremonies attended by sugarers from multiple camps and the frequent giving of maple-sugar gifts illustrate how sugaring helped establish and maintain social relations. Gifting took place across social, political, and even metaphysical boundaries (when maple sugar was left for the deceased at gravesites) (Burden 1895:25–26; Baird 1998; Fleming 2007:133; Corbiere 2011; Schenk 2012:348; Roufs 2014). This explains why producers vigorously resisted efforts by missionaries and government officials to restrict sugaring. During the late 19th century, Gilfillan (1901:70–71) observed that Chippewa women at White Earth, Minnesota, were “so fond of sugar-making that no power and no money could keep them from it,” and “the children all run away from the schools about the 22nd of March and go too."

Site-Specific Background

Three of the four sites studied are located just inland from the shore at Gros Cap, a prominent limestone breccia headland along the Lake Michigan coast. These include the Back Forty site (20MK484), the Sugar Trail site (20MK485), and the Big Hook site (20MK523) (Fig. 1). In 1845 General Land Office surveyors described the surrounding timber as sugar maple, beech, birch, and hemlock (Bureau of Land Management [BLM] 1845a). Hemlock is now scarce, but beech and sugar maple still dominate the existing forest. The Chippewa and Ottawa ceded both the Gros Cap and Pointe

Aux Chenes areas to the U.S. as part of an 1836 treaty (Kappler 1904). A map produced in 1845 shows a "settlement" along the shore west of the three sugar-camp locations (Fig. 2) (BLM 1845a). Records show that by the mid-19th century the area's Native Americans had been joined by French Canadians and Anglo-Americans (U.S. Bureau of the Census [USBC] 1850). Individuals from these groups had intermarried and lived in the settlement at Gros Cap, which is usually described as a fishing village (Hagen and Rhoades 1976:13–14). In her classic study of Great Lakes fur-trade era communities, Peterson (1978) identified Gros Cap as a "Métis settlement." This appropriately highlights the presence of both Native American and European cultural traditions at Gros Cap, but in so doing it uses a term (Métis) that the residents probably did not use themselves, and one that researchers now use more restrictively (Corp [2009]; Andersen 2011; Peterson 2012; O'Toole 2013).

Even though two of the three Gros Cap sites (20MK484 and 20MK485) were abandoned before the first issuance of land patents to private owners, land-ownership records are relevant to 20MK523, which was named the Big Hook site because an iron pothook 1.35 m long was recovered there. Figure 2 shows the ca. 1845 Gros Cap settlement and original patentee names for land parcels encompassing sugar-camp locations and adjacent stands of sugar-maple trees. Charles Bulley patented a large portion of this area (BLM 1849, 1856; USBC 1850). An undated inventory of a local antique

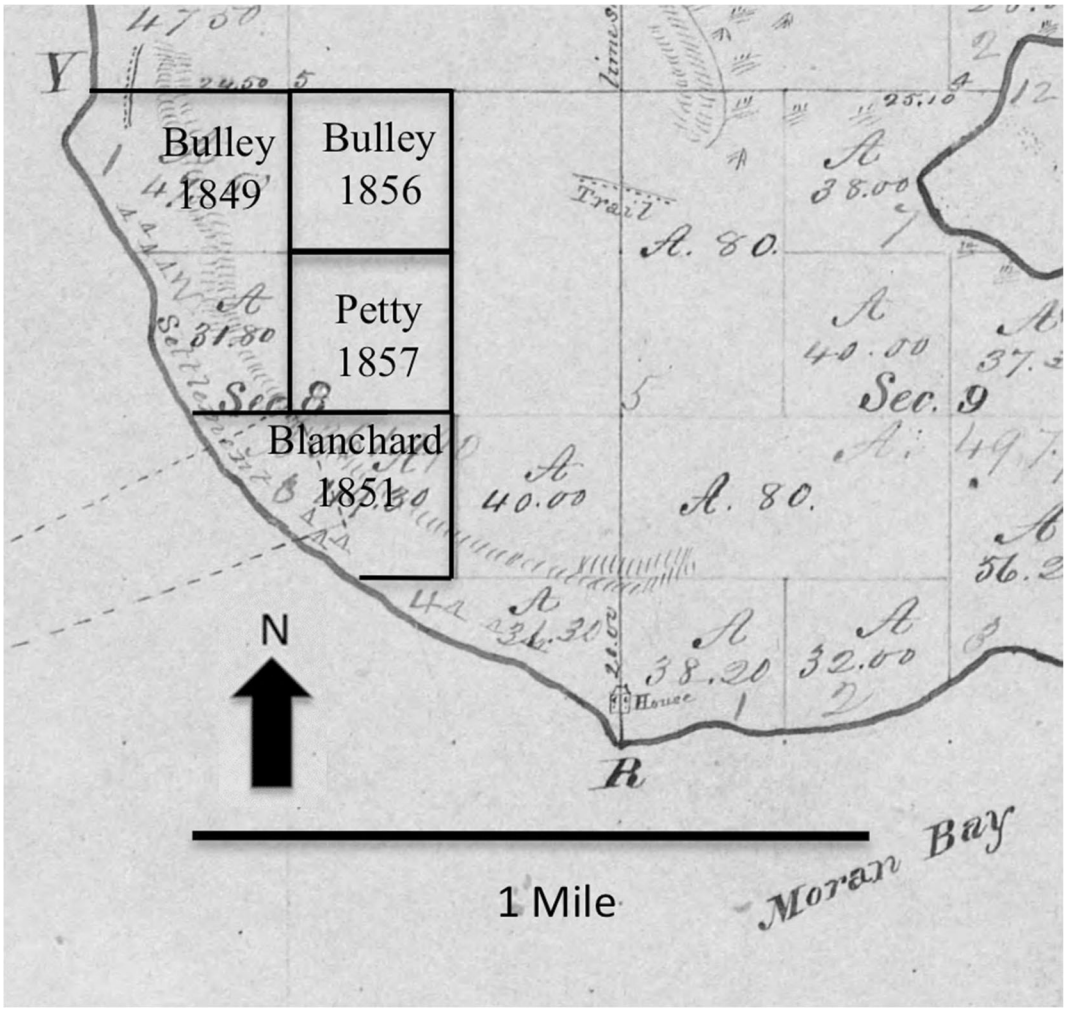

Fig. 2 Land patents at Gros Cap superimposed on the 1845 General Land Office survey map, T40N, R4W, Mackinac County, Michigan. (Drawing by John G. Franzen, 2015; base map courtesy General Land Office Records <http://www.glorecords.blm.gov>.)

collection lists a 19th-century sugar mold once owned by "Mrs. Bulley," suggesting that she could have utilized 20MK523 (E. Smith [1960]). Alternate spellings of Bulley include Bully and Bouleau, and Charles was born in Canada, presumably of French ancestry (Moran Township Board of Trustees 1997:185). After he died in 1873, his wife Hannah lived with the neighboring Blanchard family, which occupied a house built ca. 1839 about a half mile south of the Big Hook site (USBC 1850; BLM 1851; M. Smith [1970]; Campbell 1997; Corp [2009]). Cyrenius Petty patented an adjacent parcel and married Susan Blanchard, the daughter of Isaac and Mary Blanchard (BLM 1857; M. Smith [1970]). David Corp ([2009]) recalled working for Mary Blanchard in her sugar camp around 1874. Also known as Mis-an-jean-qua, an 1836 treaty roll listed her as "½ Chippewa" (Edmunds 1836). Members of the extended Blanchard/Corp family may have also used the Big Hook site for sugar production.

The fourth site examined was 20MK510 (the Mocotaugan site), located in the Pointe Aux Chenes area about 5.5 mi. northwest of the three sites at Gros Cap and similarly situated close to Lake Michigan (Fig. 1). The site name reflects the recovery of a crooked knife, called a *mocotaugan* in the Ojibwe language. The vegetation around the site ca. 1850 was a large stand of sugar maple and beech (BLM 1845b; Comer et al. 1994). The Pointe aux Chenes (Oak Point) band of Chippewa and Ottawa (sometimes known as Ance's Band) utilized both the Pointe Aux Chenes and Gros Cap areas during the 19th and 20th centuries (Schoolcraft 1837, 1852; C. Smith 1992; Shedowin 1993). The 1847 census documents maple sugaring by Ance's band (16,000 lb. produced during the census year), as well as gardening, hunting, and trapping (Schoolcraft 1852).

Fieldwork Results

Field investigations included surface collection, test excavation units, shovel/trowel tests, and soil coring. Tables 1, 2, 3, and 4 list the artifacts collected. Each site had cultural material visible on the surface. This included numerous sheet-metal fragments on the surface of 20MK484 exposed by relic hunters using metal detectors; larger objects, such as pot hooks and barrel hoops, on the surface of 20MK523; and surface occurrences of single, ferrous sheet-metal items at 20MK485 and 20MK510. Metal-detector transects helped guide unit placement. Water screening of selected soil samples through 1 mm mesh

Table 1 Inventory of artifacts from 20MK484, the Back Forty site

Count	Description
46	Ferrous sheet-metal fragments (3 with visible edge wear)
31	Cupriferous sheet-metal fragments (1 with visible edge wear)
1	White clay pipe, unmarked bowl fragment, burned
6	Flint fragments, translucent, tan or honey-colored, 0.01–0.08 g
1	Iron hand-wrought nail fragment
1	Lead disk, 15 g, 17 mm diameter, unperforated
2	Lead shot, 3.84 mm diameter
1	Sandstone, tabular whetstone, worn, 210 g
2	Iron-tool tip fragments (perforators?), corroded, 0.42 g and 1.56 g
1	Iron barrel-strap fragment, 172 mm long, 2 perforations

Table 2 Inventory of artifacts from 20MK485, the Sugar Trail site

Count	Description
14	Ferrous sheet-metal fragments (3 with visible edge wear)
5	Cupriferous sheet-metal fragments
2	Cupriferous sheet-metal kettle lugs
5	Iron nails, intact, hand wrought
4	Iron nail fragments with hand-wrought heads
3	Iron nails, unidentifiable fragments
1	Iron nail, intact, machine-cut shank, hand-wrought head
1	Gun flint, blade style, dark brown, worn, strike-a-light use?
2	Flint, dark brown fragments, burned, 1.03 and 0.22 g
2	White clay pipe, unmarked bowl fragments
1	White clay pipe, unmarked stem fragment
1	White clay pipe, bowl marked: TD, worn stem 10 mm long
2	Lead discs, single perforation in center, 13 g, 16 g
1	Lead, triangular shape, 2 perforations in center, 6.9 g
1	Wrought-iron tool, unidentified, 15.3 cm long
1	Bone button fragment, single perforation in center
1	Iron case-knife blade fragment
1	Iron pothook, S shaped, 13 cm long
1	Iron strike-a-light fragment
1	Iron barrel-strap fragment

Table 3 Inventory of artifacts from 20MK510, the Mocotaugan site

Count	Description
26	Ferrous sheet-metal fragments (2 with visible edge wear)
9	Cupriferous sheet-metal fragments (4 with visible edge wear)
2	Ferrous sheet-metal kettle lugs
1	Ferrous sheet-metal bowl or tea dish, soldered, 171 mm rim diameter
1	Ferrous sheet-metal bowl or cup fragment with rolled rim
1	Iron animal-trap spring fragment 163.5 mm long
1	Iron *mocotaugan* (crooked knife) blade 132.75 mm long
1	Iron awl fragment? heavily corroded, 3.83 g
1	Lead round ball 0.502 in. diameter
1	Cast-lead bar fragment, 51.48 g
1	Lead disk with 3 perforations, 12.66 g, 30.8 mm diameter
4	Cut nails, intact, machine headed
2	Cut nails, intact, hand-wrought heads
4	Cut-nail fragments
1	Gunflint, blade style, dark brown, 3.63 g, strike-a-light use?
1	Chert, gray fragment, battered, burned, 2.9 g
2	White clay pipe-bowl fragments, burned, thick-thin rib decoration
1	Cupriferous-metal and glass oval pendant, 24.1 × 18.7 × 3.9 mm
5	Glass fragments (2 clear, 2 olive green, 1 melted)

hardware cloth supplemented artifact recovery using 6.35 mm (¼ in.) mesh screens. The following paragraphs present the sites in chronological order.

The Back Forty Site (20MK484)

Field investigations of the Back Forty site included the excavation of 10 test units (Fig. 3) ranging in size from 0.5 × 0.5 to 1 × 1 m and covering a total of 5.95 m^2. Cultural material was dominated by charcoal, bone, and fragments of sheet metal (Table 1). The scarcity of temporally diagnostic artifacts from 20MK484 makes its chronological placement difficult, but it appears to date to the late 18th or early 19th century. The presence of numerous ferrous sheet-metal fragments suggests the site was not occupied before the mid- to late 18th century (Hanson 1992:3; Kauffman 1995:68).

Table 4 Inventory of artifacts from 20MK523, the Big Hook site

Count	Description
7	Wrought-iron pothooks made from sleigh runner shoes, 25–135 cm long
1	Wrought-iron pot hook made from bar 1.8 cm diameter, 39 cm long
1	Wrought-iron chain trammel, 82 cm long
1	Ferrous sheet-metal friction cap 3.75 in. (9.5 cm) diameter
2	Cast-iron kettle fragments, 4.5 mm thick, from vessel ca. 19 in. (48 cm) diameter
1	Ferrous sheet-metal perforated disk, 21 cm diameter (strainer?)
1	Wrought-iron single-bit ax head, 3.87 lb. (1.76 kg)
1	Iron, heavy wire, 67 cm long, 5.6 mm diameter
171	Cut nails, machine headed
1	Cut nail with hand-wrought head
2	Wire nails
1	Brass .22 cal. cartridge case marked: U
67	Stoneware (gray paste) jug fragments, salt-glazed exterior, brown slip interior
7	White-earthenware fragments, blue sponge decoration
11	White-earthenware fragments, undecorated
19	Glass fragments, olive green, from 3-piece-mold bottle
18	Glass fragments, clear
1	Ferrous sheet-metal, hand-soldered meat or sardine can
1	Porcelain Prosser button, 4 holes
1	Iron wood screw
1	Iron spoon fragment
5	Iron spikes, intact, 5.5–7 in. (12.7–17.8 cm) long, hand-wrought heads
6	Iron-spike fragments

A hand-wrought nail fragment and six small fragments of translucent tan or honey-colored European flint are also consistent with a late 18th- or early 19th-century occupation (Kenmotsu 1990:96; Adams 2002). A lead disk ca. 1.7 cm in diameter is unperforated, but otherwise resembles 18th-century fishing weights from Fort Michilimackinac (Morand 1994:43). Two lead shot, both 3.84 mm in diameter, each weighed 0.32 g, a size suitable for hunting birds or small mammals. A smoothed and striated tabular whetstone weighing 210 g resembles the red Cambrian sandstone that underlies large portions of the Lake Superior basin. Fragments of this material frequently appear in local glacial till. Researchers also attribute whetstones

from other fur-trade era sites to local sources (Wheeler et al. 1975:77; Morand 1994:51). A rectangular, iron-strap segment with one end that appears worn resembles flattened sections of barrel bands found at Fort St. Joseph, Ontario, 40 mi. northeast of Michilimackinac and occupied between 1797 and 1812 (Light 1987:26).

Internal variation at this site suggests three possible activity areas (Fig. 3). One consists of small, cupriferous sheet-metal fragments in an area disturbed by relic hunters. A second area includes relatively low-density and shallow cultural remains in the most level portion of the site (Test Units 1, 2, 3, 7, and 8). Finally, in and around the lowest portion of the site, Test Units 4, 5, 6, 9, and 10 encountered deeper, organically stained soils with a relatively high density of cultural material and a majority of the charcoal and faunal remains, consistent with proximity to the sap-boiling area.

The Sugar Trail Site (20MK485)

Shovel testing defined this site's extent as about 120 m^2 (Fig. 4). Test excavation consisted of six 1 × 1 m units and a single 1 × 0.35 m unit. Charcoal and bone dominated the recovered material, but temporally and functionally diagnostic artifacts were also present (Table 2). Of the six intact nails, five were hand wrought, and one appears to be an early machine-cut nail with a hand-made head, suggesting a date of around 1800 (Wells 1998:78–79; Adams 2002:80). Heavy wear on a dark gray-brown blade-style gunflint made from English flint indicates probable use with a strike-a-light. According to Hamilton and Emery (1988:14), this type of gunflint was not imported into the area until ca. 1800. A broken strike-a-light (Fig. 5*a*) resembles 18th-century examples from Fort Michilimackinac (Stone 1974:187). Only three white clay pipe fragments were found, but one nearly complete bowl was marked: TD (Fig. 5*b, c*). The proximal end of its very short 10 mm long stem was worn smooth from use. This pipe matches the "type 27" style dated 1780–1820 based on the typology developed by Atkinson and Oswald (Mallios 2005:96). Some researchers suggest a correlation between short pipe stems and low socioeconomic status (Gojak and Stuart 1999:40; Rudy 2005:71). Longer-stemmed pipes cost more and were unsuited for use while performing manual labor or moving about because of their fragility. However, pipes with very short stems would be difficult to smoke without burning the fingers or lips.

Two lead disks (Fig. 5*d, e*) with single perforations resemble 18th-century examples from Fort Michilimackinac interpreted as fishing weights (Morand 1994:43). The function of the third lead object remains unidentified; although all three sides are concave, it is roughly triangular, with two small perforations (Fig. 5*f*). The object could have been an ornament, but it also resembles toys or noisemaking objects called "whizzers" commonly found at fur-trade era sites (Good 1972:154–155; Stone 1974:154). Although most whizzers are circular, Culin (1992:751–757) illustrates irregularly shaped examples. One unidentified wrought-iron object superficially resembles a spear tip (Fig. 5*g*), but it has dull and thick tines lacking barbs. In some respects, this object resembles the distal ends of 19th-century "sugar devils" or "fruit augers" used for loosening dried fruit or sugar packed in barrels (Roger 2007). Other iron objects include a case-knife blade fragment and a 13 cm long pot hook (Fig. 5*h*). Eighteenth-century pothooks recovered from Fort Michilimackinac are also relatively short (14–25 cm long) (Stone 1974:189–190). The only clothing-related item found was a bone button with a single perforation. Maxwell and Binford (1961:92) suggest bone buttons became common at Fort Michilimackinac after 1770 and may have been locally produced. Charcoal density varied, with Test Unit 7 containing over 200 g, indicating likely proximity to the sap-boiling area, while Test Unit 4 contained only 0.9 g. A cluster of nails in and around Test Unit 8, about 6 m southwest of the probable boiling area, may represent a structure where sugaring equipment was stored between seasons (Fig. 4).

The Mocotaugan Site, 20MK510

Test excavation units at this site encompassed 3.75 m^2, with the site covering about 135 m^2 (Fig. 6). Beside charcoal and bone, sheet-metal fragments were the most common items recovered, including a large, heavily worn, cupriferous sheet-metal tool (Table 3) (Fig. 7*a*). Wrought-iron artifacts included an animal-trap spring fragment with an intact round eye (inside diameter ca. 2.6 cm), resembling fragments from Fort St. Joseph, Ontario (Light 1987:figure 29h). Light (1987:29) writes that eyes 2–3 cm in diameter characterize traps used for medium-size furbearers, such as beaver. This handmade

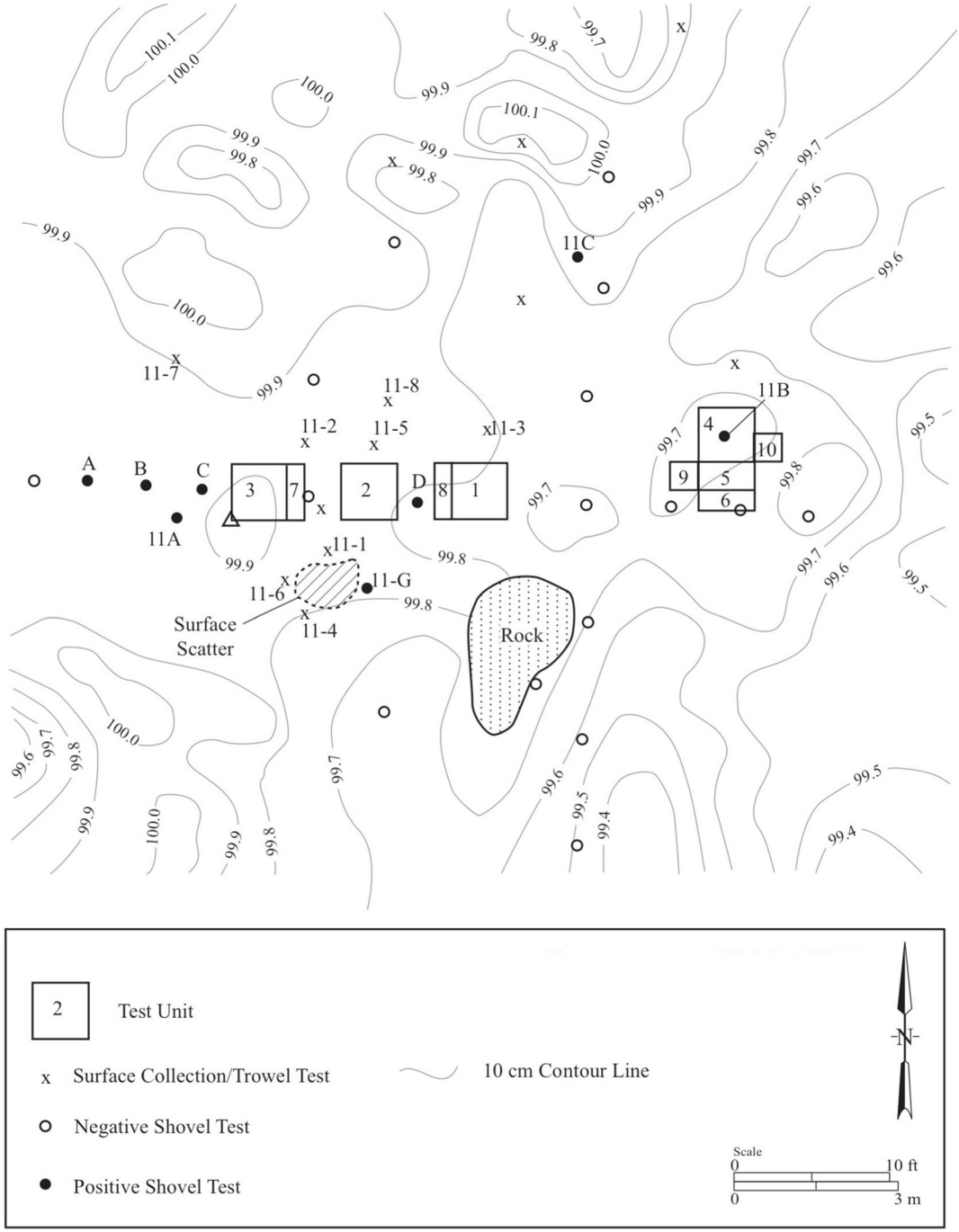

Fig. 3 Site map, 20MK484, the Back Forty site. (Drawing by James Montney, CCRG, Inc., 2012; based on drawing by John G. Franzen.)

style is typical of the ca. 1750–1850 period, prior to the mid-19th-century transition to machine-made traps (Russell 1967:116,121). Shovel Test T recovered an iron *mocotaugan* (crooked-knife) blade with a broken tang and a blade section 115 mm long (Fig. 7*b*). A crooked-knife blade was also found at the nearby Gros Cap Cemetery site (Nern and Cleland 1974:10–11). *Mocotaugans* functioned as drawknives for making wooden items like canoe frames, paddles, tool handles, sleds, and snowshoes (R. Wheeler 1985:60; Jalbert and

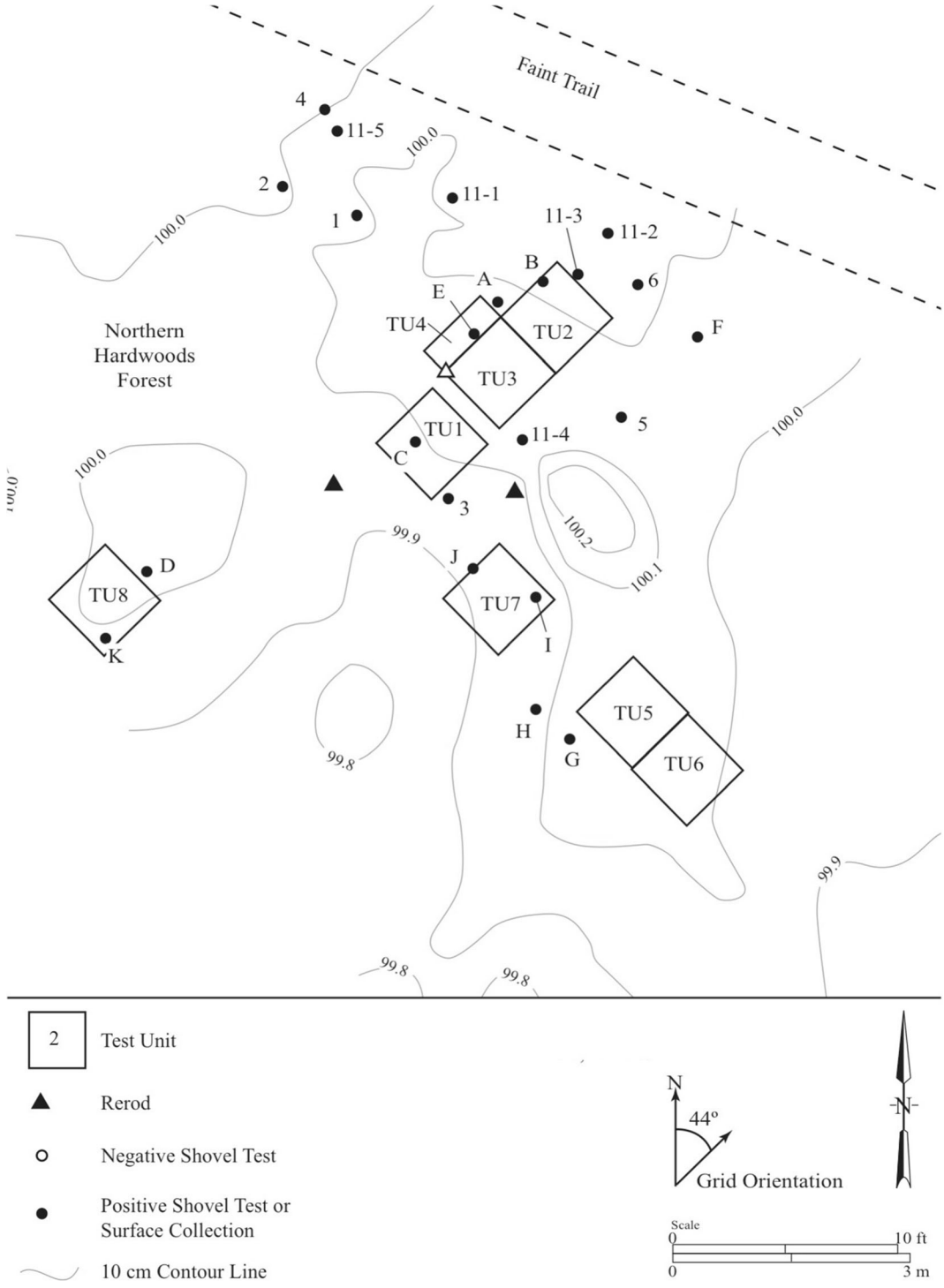

Fig. 4 Site map, 20MK485, the Sugar Trail site. (Drawing by James Montney, CCRG, Inc., 2012; based on drawing by John G. Franzen.)

Jalbert 2003). This example resembles the western Great Lakes style, with a longer blade and more curved tip than the Northeast Maritime or Iroquoian styles (Jalbert and Jalbert 2003:55). Although used throughout the fur

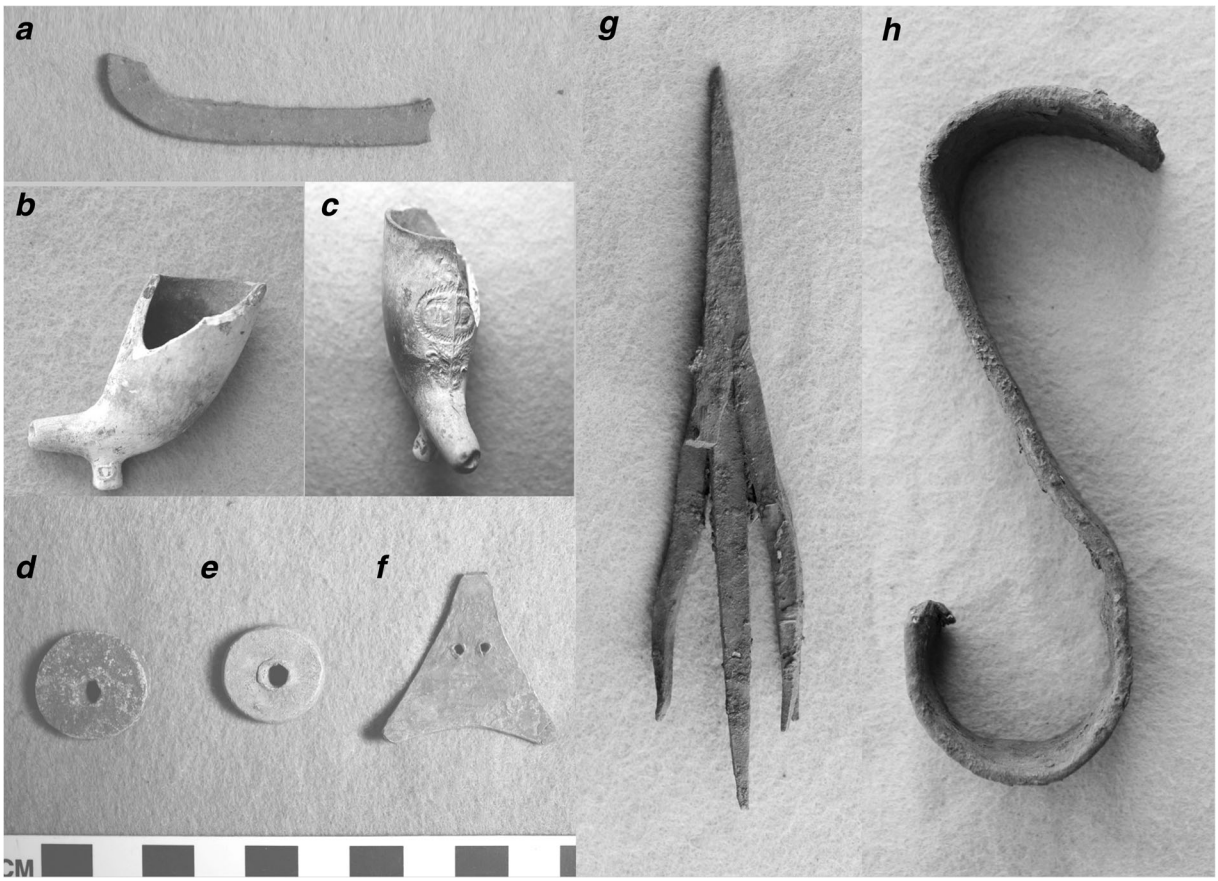

Fig. 5 Artifacts from Site 20MK485, (*a*) a strike-a-light, (*b*, *c*) a white clay pipe, (*d–f*) lead artifacts, (*g*) an unidentified tool, and (*h*) a pot hook. (Photos by John G. Franzen, 2012.)

trade, *mocotaugans* usually appear in descriptions of Native American activities (Bradley 1987:229; Jalbert and Jalbert 2003).

A lead ball approximately 0.5 in. diameter, weighing 11.68 g, could have been fired by .52 cal. rifles manufactured in large numbers for the American Fur Company and the U.S. Indian Trade Office during the early to mid-19th century (Russell 1957). A cast-lead bar fragment is similar in cross section to 1 lb. bars found at other fur-trade era sites; segments of these could be melted in small single-handled crucibles to make musket balls, net sinkers, or other items (Gilbert and Rogoski 1986:6; Switzer 2013:316). This bar indicates local manufacture of lead objects, and a lead disk with three perforations was also recovered. Some sources identify similar disks with three or more perforations as whizzers, although no explanations for the extra holes are offered (Good 1972:154; State Museum of Pennsylvania/Pennsylvania Historical and Museum Commission 2012).

Alternating thick/thin ribbed decoration appeared on two small, burned, white clay pipe-bowl fragments, and Hinshelwood (1995:393–395) suggests this style of decoration was most popular ca. 1825–1850. An oval-shaped brass pendant frame with an opaque milky-purple glass inset found in Shovel Test L (Fig. 7c) resembles "mourning pendants" that included mementos of deceased friends or relatives, such as hair or a photograph enclosed by a clear glass dome (Nehama 2012). Sheumaker (2007:18) indicates that Victorian hairwork jewelry was popular during the 1830s–1880s as an expression of what she calls middle-class "fashionable sentimentality." A dark brown blade-style gunflint manufactured from English flint shows moderate to heavy edge wear, suggesting use with a strike-a-light. Heavy battering and traces of oxidized ferrous metal on the edge of a heat-altered, light gray chert fragment indicate similar usage. The mix of cut nails with both hand-wrought and machine-made heads is consistent

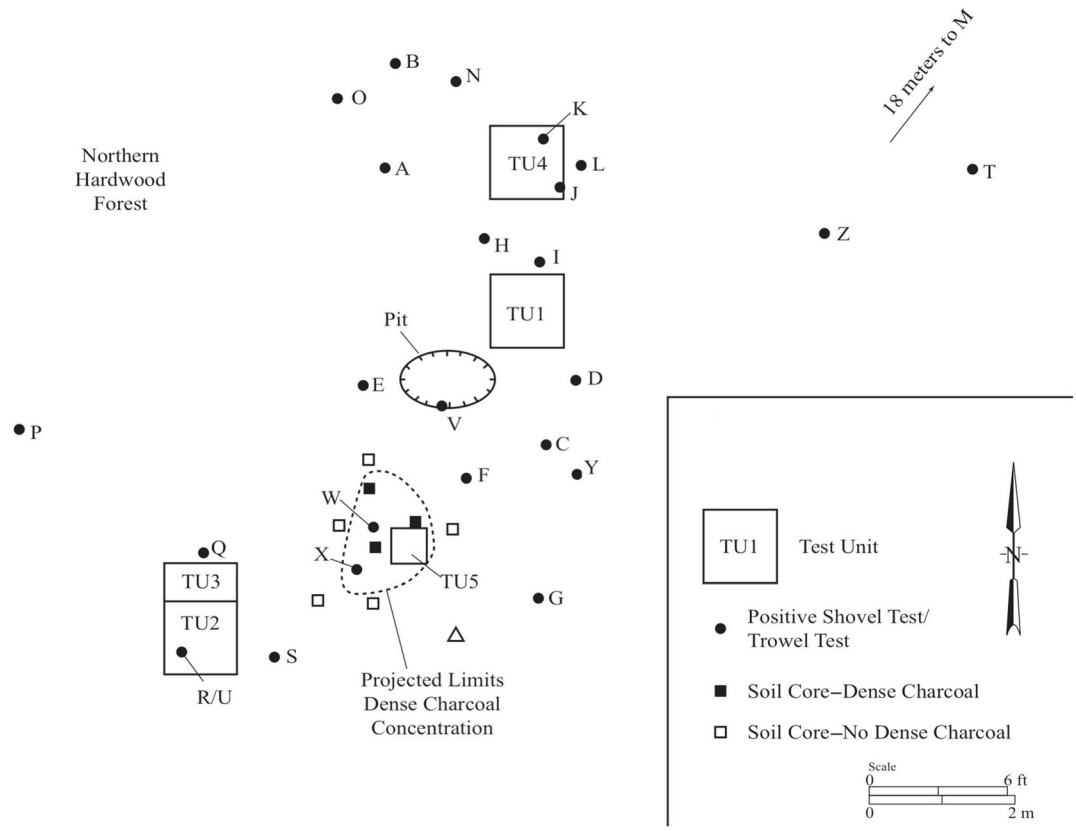

Fig. 6 Site map, 20MK510, the Mocotaugan site. (Drawing by James Montney, CCRG, Inc., 2012; based on drawing by John G. Franzen.)

with an occupation during the second quarter of the 19th century (Wells 1998:78–79; Adams 2002:80–83).

A dense charcoal deposit encountered in Test Unit 5 and Shovel Tests X and W represents a likely sap-boiling area. Soil coring defined its horizontal extent as about 1.6 × 1.25 m. It consisted of very dark, charcoal-rich soil initially mapped as 10YR 2/1 (black), but because it contains so much decomposed charcoal its color may be closer to N1/ or N2/ (neutral or achromatic black) (Munsell Color 1975). The largest charcoal fragments are concentrated 6–10 cm below the surface. No artifacts were found in Test Unit 5, but nearby Shovel Tests W and X each recovered a cut nail from this deposit. Test Unit 5, which was only 50 × 50 cm, yielded a total of 149 g of charcoal.

The Big Hook Site (20MK523)

Large metal objects were visible on the surface of this site, and others were identified within the surface horizon of decomposing leaves. Shovel-test and metal-detector transects defined its area as about 140 m^2 (Fig. 8). Field investigations included two 1 × 1 m test excavation units, a 3.4 × 0.3 m test trench, and soil coring that defined a burned zone (boiling area) feature. Cultural material was dominated by charcoal, burned rock, and cut nails. The site included a distinctive assemblage related to maple-sap processing, most notably eight heavy iron pothooks, seven of which were made from repurposed sleigh-runner shoes (Table 4) (Fig. 9*a*). A wrought-iron chain trammel, also used for suspending kettles, included two hooks with decoratively scrolled tips (Fig. 9*b*). Trammels were used in colonial New England "open-hearth" cooking (Nutting 1965:668). At an 18th-century Native American site near Saginaw, Michigan, the only statistically significant correlations between gender and specific funerary objects found by Mainfort (1979:309,327) were the associations of trammels, pothooks, and axes with females. Other sugaring-related artifacts from the Big Hook site include two cast-iron kettle-rim fragments representing a large vessel about 48 cm in diameter; a 21 cm diameter perforated sheet-iron disk, likely used as a strainer; and a single-bit iron ax head weighing 3.87 lb. Artifacts observed, but

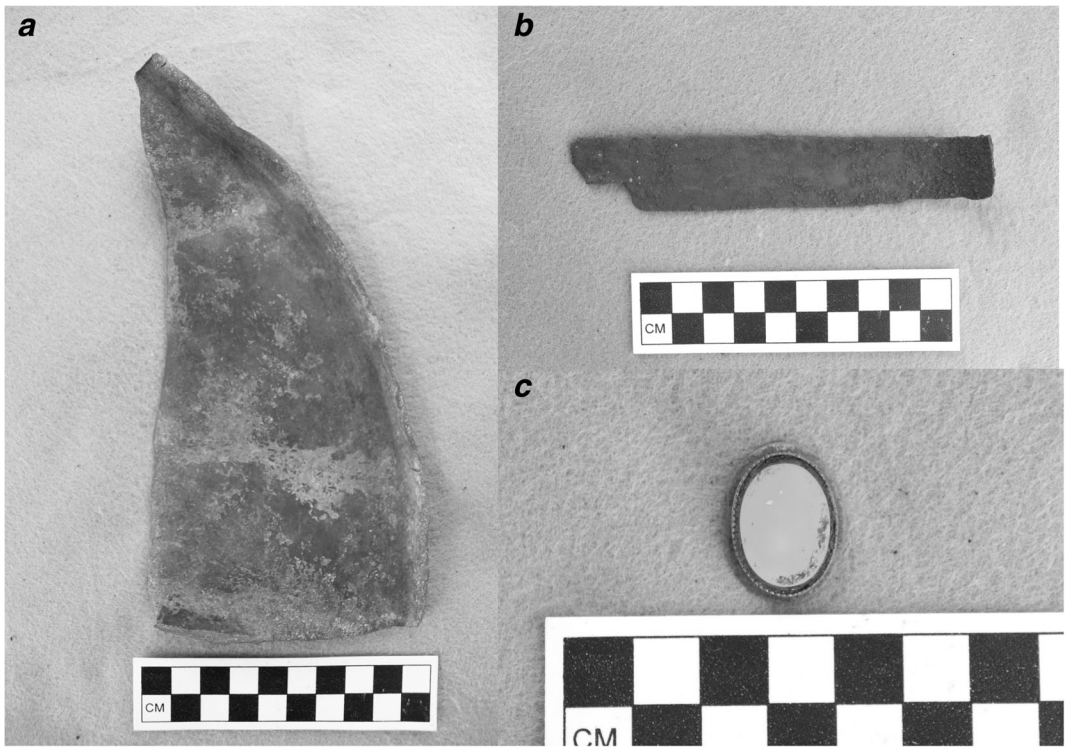

Fig. 7 Artifacts from 20MK510, the Mocotaugan site: (*a*) a cupriferous sheet-metal tool, (*b*) a *mocotaugan* (crooked knife), and (*c*) a pendant. (Photos by John G. Franzen, 2012.)

not collected, may relate to sap storage (barrel hoops) and the clearing of snow or ashes (a shovel blade).

The nail assemblage is characteristic of the mid- to late 19th century (Adams 2002), and the abundance of nails suggests the presence of a structure (Table 4). Of the nails complete enough for size classification, 83% were 8d or 10d, and 17% were 3d or 4d. These sizes are probably too small to represent the remains of balloon-frame walls and may relate to lighter-framed structural elements (Young 1994a, 1994b; Corp [2009]:12). A single, .22 cal. brass cartridge case, postdating the establishment of the Union Metallic Cartridge Co. in 1867, is marked: U (Fontana and Greenleaf 1962:8). The white earthenware recovered includes sherds with blue sponge decoration. This style spans a long period, but was most popular during 1840–1860 (Ketchum 1983:178,228–229; McConnell 1990:29). Other 19th-century artifacts include salt-glazed stoneware jug fragments, green bottle-glass shards with remnants of an applied ring and seams indicating three-piece mold manufacture, and a hand-soldered rectangular meat or sardine can (Fontana and Greenleaf 1962:71–72; Rock 1989:153–154). The boiling feature at the Big Hook site exhibits black, organically stained silt loam with charcoal and ash above heat-oxidized subsoil and burned carbonate rock. Dense charcoal extended horizontally about 1.7 m in profile, and underlying burned soil and rock defined an oval area 1.7 × 1.25 m with a maximum depth of 23 cm. Three large iron pothooks were found on the surface above this feature, with the remaining five hooks within 2.3 m of its edge (Fig. 10).

Analysis

The archaeological data collected were compared to the expectations, outlined earlier, for sugar camps where open-fire sap boiling took place (Quimby 1962; Holman 1984). In considering the differences among sites, the relatively small proportion of each excavated (between 2.2 and 6.1%) should be kept in mind. The four sites are very similar in size, ranging from 120 to

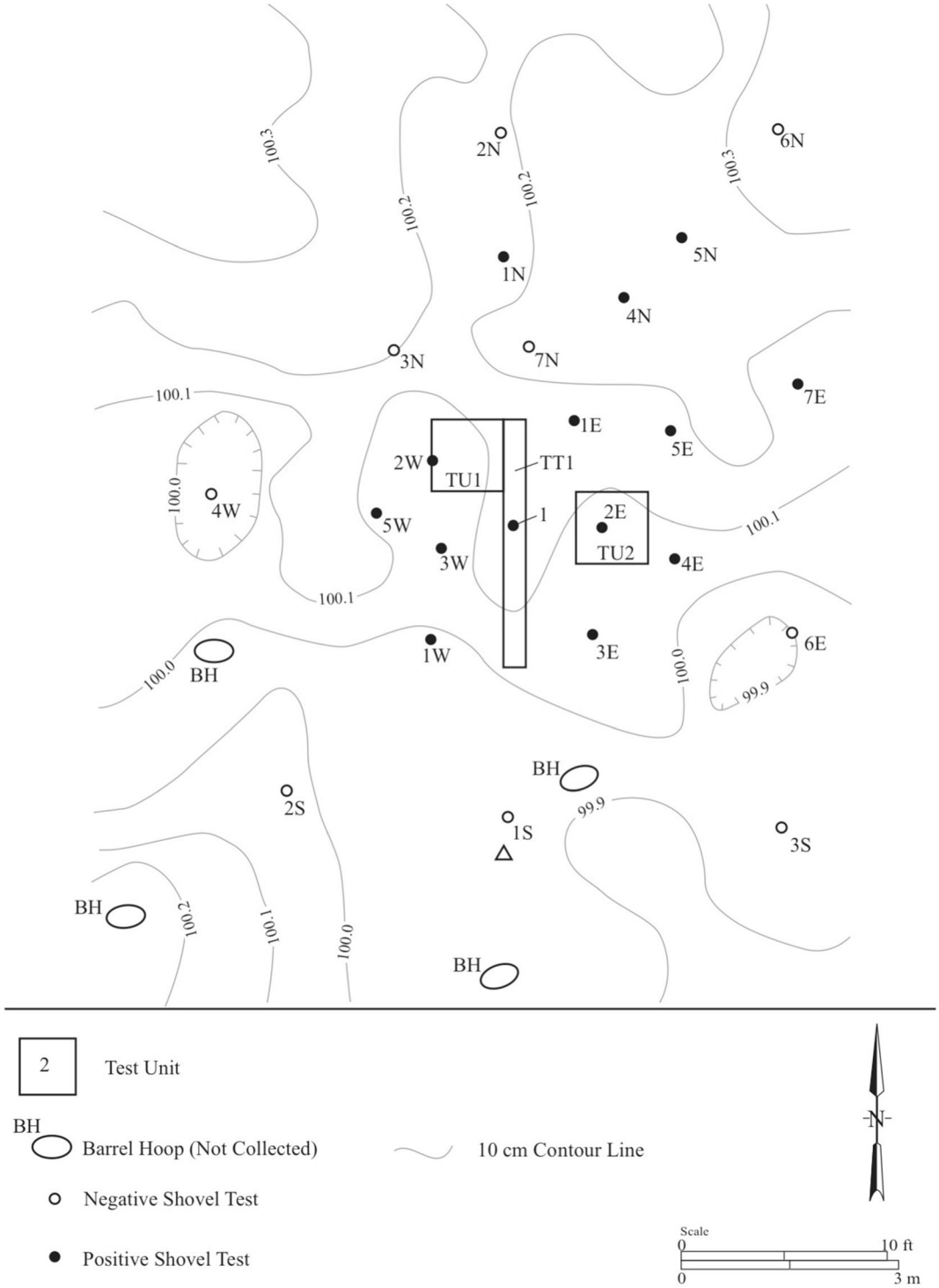

Fig. 8 Site map, 20MK523, the Big Hook site. (Drawing by James Montney, CCRG, Inc., 2012; based on drawing by John G. Franzen.)

140 m^2. Based on temporally diagnostic artifacts, they span roughly 100 years between the late 18th and late 19th centuries, offering an opportunity to examine changes in sugaring practices during the transition from an economic system based on the fur trade to one based on more intensive extractive industries (mining,

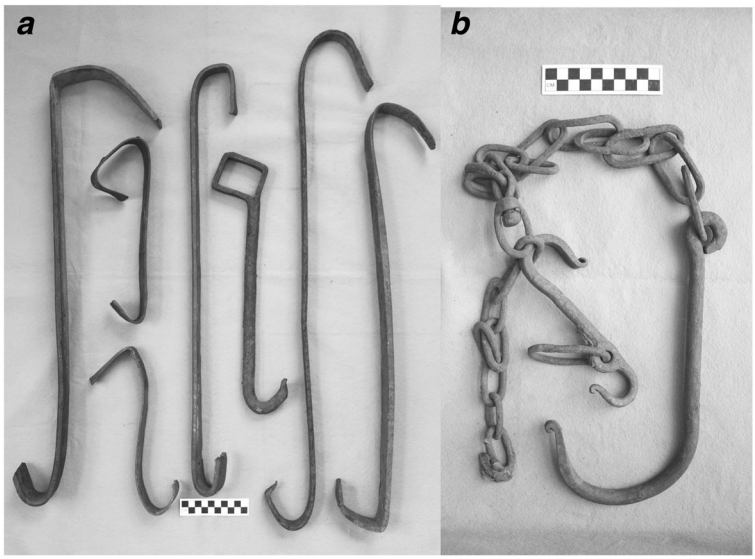

Fig. 9 Artifacts from the Big Hook site (20MK523): (*a*) pot hooks and (*b*) a trammel. (Photos by John G. Franzen, 2012.)

logging, and commercial fishing) associated with a dramatic expansion of transportation infrastructure during the 19th century.

Expectation: "Extensive Hearths"

Sugar camps where open-fire boiling took place should include evidence of "extensive hearths" (Quimby 1962:177–178). Charcoal is abundant at all four tested sites (Table 5). A well-defined hearth feature with burned rock and soil was documented at 20MK523; charcoal deposits provided indications of boiling areas at the three earlier sites. Possible explanations for the absence of distinctive burned rock or soils at these sites include geological substrate differences and post-occupation site-formation processes. Although charcoal extends over a much wider area, the actual burned zone at 20MK523 is relatively small (1.7 × 1.25 m), so similar features may remain undiscovered at the other sites. Analysis revealed a high proportion of *Fraxinus* sp. charcoal at the two earliest sites (20MK484 and 20MK485) (Table 5). Based on the surrounding habitat, this is almost certainly from white ash (*Fraxinus americana*), which is the only northern hardwood species considered burnable even when "green" or "unseasoned" (Baierlein 1996:79; Cook 1999:56,76). White ash is also known as one of the easiest firewoods to split (Cook 1999:53). Sugar maple (34.8%) and beech (18.3%) dominate Michigan's old-growth northern hardwood stands, and white ash usually makes up no more than 2–4% of these stands (Elliott 1953; Macfarlane and Meyer 2005:10).

The dominance of *Fraxinus* sp. charcoal at 20MK484 and 20MK485 is consistent with the expectation that sugar makers would prefer hardwoods because of their high heat value and relatively benign smoke, and that mobile groups covering relatively large areas in a seasonal round would prefer the hardwood species that is easiest to burn (Asouti and Austin 2005). At the Big Hook site (20MK523), *Fraxinus* sp. utilization decreased, while combined maple, beech, and birch use increased (Table 5). White ash could have been depleted over time in this area of intensive sugaring, and after the establishment of a permanent settlement nearby, the availability of better tools and transportation methods would have made it easier to cut and season other species. *Acer* sp. charcoal dominated the Mocotaugan site (20MK510), and sugar maple is the species most abundant in both past and present vegetation there (BLM 1845b; Comer et al. 1994).

Comparing the locations of charcoal concentrations to intrasite artifact distributions suggests a relationship with prevailing winds, which are from the northwest in February and March and from the west northwest in April (National Climatic Data Center 1998). Site plans (Figs. 3, 4, 6) show the majority of artifact scatters at sites 20MK484, 20MK485, and 20MK510 extend upwind from dense charcoal deposits, consistent with avoidance of smoke. The relatively small size of all sites (120–140 m^2) also agrees with predictions that sugar-

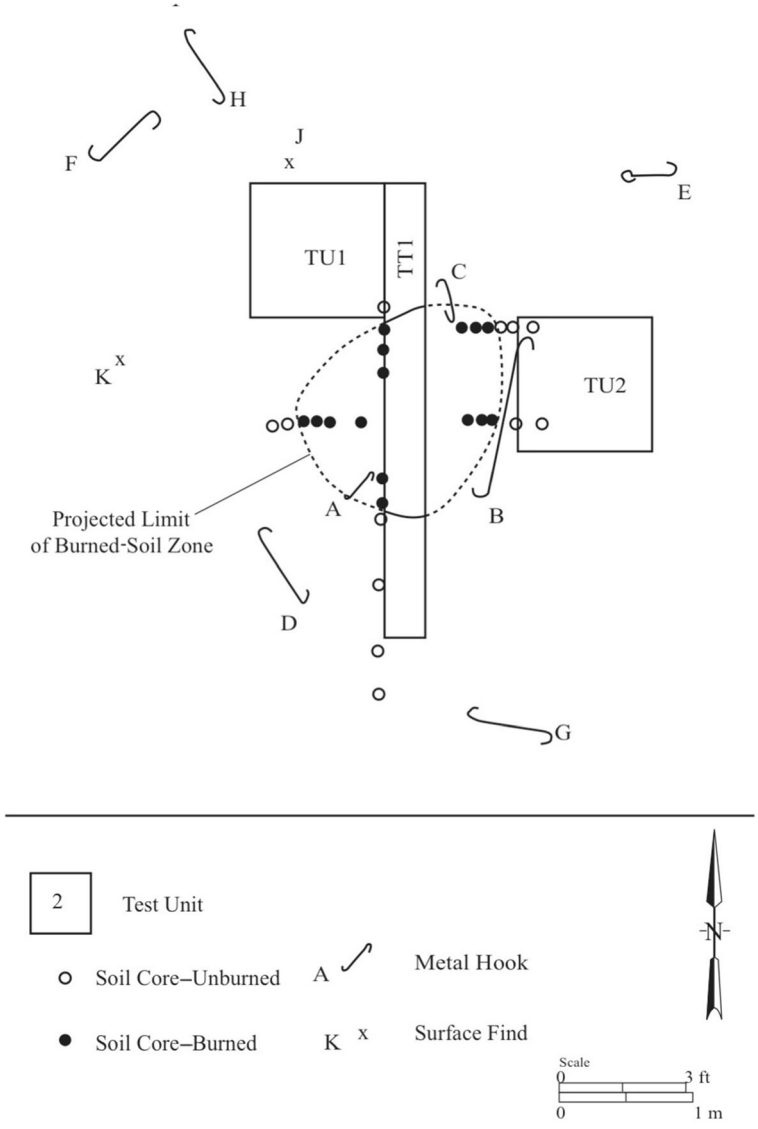

Fig. 10 Big Hook site (20MK523): boiling-area detail map. (Drawing by James Montney, CCRG, Inc., 2012; based on drawing by John G. Franzen.)

camp activities would be spatially concentrated (Holman 1984).

Expectations: Faunal Remains

Quimby (1962) and Holman (1984) predicted sugar camps would include the remains of fish, small mammals, and birds, with large mammals scarce. Excavations at the three earliest sites confirmed this prediction (Tables 6, 7, 8). The only evidence of either wild or domestic large mammals at these sites was a single tooth fragment from a horse at 20MK510. According to the 1847 Indian Department census, the Pointe Aux Chenes band possessed seven horses, a relatively large number compared to other bands (Schoolcraft 1852). Animal remains were most abundant and diverse at the Sugar Trail site (20MK485), where the dominant species were lake trout, whitefish, walleye/sauger, lake sturgeon, and muskrat (Table 6). In contrast to this abundance, bone was scarce at the Big Hook site, where only seven specimens were recovered, representing a whitefish, a tree squirrel, a pig, and a domestic cat. This difference may relate to the establishment of permanent residences at Gros Cap by the mid-19th century, possibly reducing the amount of food preparation conducted at nearby sugar camps. Improved transportation infrastructure

Table 5 Wood-charcoal analysis

	Site		Site		Site		Site	
	MK 484		MK485		MK510		MK523	
	Wt. (g)	%	Wt. (g)	%	Wt. (g)	%	Wt. (g)	%
Acer sp.	16.04	22	12.37	22	48.1	78	12.64	21
Betula sp.	0.2	<1	3.84	7	3.78	6	9.24	16
Fagus sp.	5.3	7	5.43	10	1.14	2	17.43	30
Fraxinus sp.	22.49	31	21.91	40	0.17	<1	0.73	1
Ostrya sp.	1.8	2	2.8	5	1.01	1	0.49	<1
Prunus sp.	0.24	<1	—	—	1.36	2	0.4	<1
Tilia sp.	—	—	—	—	—	—	0.14	<1
Ulmus sp.	3.01	4	—	—	—	—	—	—
Unidentified hardwood (ring porous)	15.89	22	0.65	1	—	—	0.59	1
Unidentified hardwood (diffuse porous)	7.65	11	7.84	14	6.16	10	17.4	30
Conifer	—	—	0.49	1	—	—	0.2	<1

would also have made salted or canned meats, which are often boneless, more available and affordable.

Lake sturgeon, walleye/sauger, and whitefish appear at all three early sites (Tables 6, 7, 8). Lake trout remains are present at only two sites (20MK484 and 20MK485), but are the most abundant species (NISP) overall. Although not necessarily a universal pattern, in the mid-19th century in northern Wisconsin Ely observed that "the Indians never go far from rivers or lakes to make sugar" (Schenk 2012:347). The seasonal implications of fishing relative to maple sugaring warrant examination. Warming temperatures induce spring sap flows, and the optimal weather for maple sugaring in northern Michigan occurs between late February and early April (Marvin and Erickson 1956; Menne et al. 2009). Lake Michigan ice usually persists at Gros Cap through the sugaring season, disappearing from offshore areas in late March, but often persisting until early April along the shore (Assel 2003). Although the possibility of some bones originating from fish harvested previously and stored cannot be discounted, late winter was traditionally a time of food scarcity, and the ethnohistorical literature points to fishing as key to preventing starvation during this period (Strang 1855:283–284; Schenk 2012:347). David Corp ([2009]) recalled that 19th-century Gros Cap fishermen “speared, bobbed, or snatched for lake trout” during the winter and set gill nets under the ice for trout and whitefish. Strang (1855:283–284) indicates spearing sturgeon through the ice provided "winter subsistence for the Indians." The relatively large sizes of the fish identified are consistent with procurement by spearing, hook and line, or gill nets (Table 9). It is unlikely that this finding results from recovery bias. Samples water screened through 1 mm mesh did not identify any smaller individuals.

Our findings counter impressions given by some historical accounts that faunal resources were not an essential part of subsistence at sugar camps because so much sugar was available (Bain 1901:211). Racial ideology may distort some of these accounts when they describe high rates of sugar consumption as examples of so-called "gluttony" by French Canadians or Native Americans (Schenk 2012:91,97). Although humans crave sweet food, they also crave fat and some level of dietary diversity (Rolls et al. 1981). There is even a phenomenon called "sensory specific satiety" (also known as "flavor fatigue") that can develop when a single food is repeatedly consumed without variation, even if it is a preferred flavor (Rolls et al. 1981). Eating mostly sugar for a month or more may be possible, but large amounts of sugar increase the rapidity of food transit and can cause diarrhea (Porter 2009). It is unlikely anyone preferred this to a more balanced diet, except as an alternative to starvation.

Table 6 Animal remains, 20MK485, the Sugar Trail site

	NISP	MNI	NISP Wt. (g)	NSP Burned/Calcined
CLASS: MAMMALS	17	4	8.2	0/3
Snowshoe hare, *Lepus americanus*	1	1	0.3	0/0
Woodchuck, *Marmota monax*	2	1	2.6	0/0
Muskrat, *Ondatra zibethicus*	11	1	3.7	0/2
Porcupine, *Erethizon dorsatum*	1	1	0.6	0/0
Subtotals identified mammals	15	4	7.2	0/2
Unidentified medium mammal	1	—	0.5	0/1
Unidentified small/medium mammal	1	—	0.5	0/0
CLASS: BIRDS	15	4	4.7	1/0
Duck spp., subfamily Anatinae	6	2	2.0	1/0
Bald eagle, *Halieetus leucocephalus*	1	1	1.0	0/0
Long-eared owl, *Asio otus*	1	1	0.6	0/0
Subtotals identified birds	8	4	3.6	1/0
Unidentified medium/large bird	3	—	0.2	0/0
Unidentified medium bird	4	—	0.9	0/0
CLASS: FISH	368	20	62.2	7/29
Lake sturgeon, *Acipenser fulvescens*	19	3	8.9	1/0
Pike/muskellunge, *Esox* sp.	11	1	0.6	0/0
Lake/round whitefish, subfamily Coregoninae	56	3	5.4	6/2
Lake trout, *Salvelinus namaycush*	126	5	27.3	0/8
Black bass, *Micropterus* sp.	5	1	4.1	0/0
Walleye/sauger, *Sander* sp.	18	5	5.0	0/0
Perches, family Percidae (scales)	42	—	0.6	0/0
Freshwater drum, *Aplodinotus grunniens*	6	2	4.3	0/0
Subtotals identified fish	283	20	56.2	7/10
Unidentified fish	85	—	6.0	0/19
UNIDENTIFIED VERTEBRATA	15	—	3.4	0/4
CLASS: BIVALVES	2	—	4.2	0/0
Unidentified mussel	2	—	4.2	0/0
GRAND TOTALS	417	28	82.7	8/36
Totals, identified below class	306	28	67	8/12
Percentage identified	73.3	—	82.8	10.8

No other faunal assemblages from the Mackinac Straits area exhibit the nearly complete absence of large mammals seen at these sugar camps. Scarcity (or absence) of domestic species and an abundance of wild species have been interpreted as a post-European Native American pattern (Carlson 2012). However, this remote setting far from commercial and agricultural centers could "mute" ethnic differences by constraining the choices of all groups, and "economic standing" can be a more important dietary factor than ethnicity (Scott 2008:363,371; Carlson 2012:69). Religious practices may also have affected subsistence choices at sugar camps. Roman Catholic beliefs were common among the early to mid-19th-century French Canadian and Native American residents

Table 7 Animal remains, 20MK484, the Back Forty site

	NISP	MNI	NISP Wt. (g)	NSP Burned/Calc.
CLASS: MAMMALS	5	2	9.7	0/0
Woodchuck, *Marmota monax*	4	1	9.7	0/0
Unidentified small mammal	1	1	<0.1	0/0
CLASS: BIRDS	2	1	0.8	0/0
Ruffed grouse, *Bonasa umbellus*	1	1	0.6	0/0
Unidentified medium bird	1	—	0.2	0/0
CLASS: FISH	104	7	16.2	0/6
Lake sturgeon, *Acipenser fulvescens*	7	1	2.8	0/2
Lake/round whitefish, subfamily Coregoninae	1	1	<0.1	0/1
Lake trout, *Salvelinus namaycush*	40	3	7.1	0/3
Walleye/sauger, *Sander* sp.	6	2	2.4	0/0
Subtotal identified fish	54	7	12.3	0/6
Unidentified fish	50	—	3.9	0/0
Unidentified vertebrates	3	—	0.2	0/2
Grand totals	114	10	83.3	0/8
Totals, identified below class	59	9	22.6	0/6
Percentage identified	51.8	—	27.1	—

of the Mackinac Straits. The date of Easter falls between 22 March and 25 April (inclusive), and the best sugaring conditions occur between late February and early April. Consequently, major portions of the sugaring season could fall within the Lenten meat fast that extends for approximately six weeks prior to Easter. Cleland (1970:18) suggests that the predominance of Catholicism and related meat fasting may have contributed to high rates of fish consumption during the 18th-century French occupation of Fort Michilimackinac.

In general, the four dominant fish species at 20MK484 and 20MK485 (sturgeon, lake trout, whitefish, and walleye/sauger) also dominate the fish remains found at other Mackinac Straits area sites, including those occupied by various ethnic groups from late pre-European times through the early 19th century (McPherron 1967; Cleland 1970; Shapiro 1978; T. Martin 1981; P. Martin 1985; Scott 1985; Carlson 2012). This lends support to Scott's (1991:45) suggestion that all groups around the Mackinac Straits used similar fish-procurement strategies. The fish remains found at these sugar camps show that certain species were sometimes procured at other-than-optimal times. It is well established that lake trout and whitefish are easiest to procure in large quantities during the fall when they spawn on shoals, but, along with sturgeon and walleye/sauger, they also move into relatively shallow water during the late winter and early spring (Strang 1855; Redick 1967:13,15; Colby et al. 1979; Cleland 1982:767; Johnson 2001:2,5; Dewey 2008; Baker and Auer 2013:81; Michigan Department of Natural Resources 2015).

Discussion

Comparing artifacts from the four sites tested reveals major differences between the mid- to late 19th-century Big Hook site (20MK523) and the three earlier sites (20MK484, 20MK485, 20MK510) (Tables 1, 2, 3, 4). The Back Forty (20MK484) and Sugar Trail (20MK485) sites predate increased European American incursions and development for resource extraction following land cessions stipulated in the 1836 treaty with the Ottawa and Chippewa (Kappler 1904). The Mocotaugan site (20MK510) was occupied during roughly the same period as this treaty, and the Big Hook site (20MK523) dates to

Table 8 Animal remains, 20MK510, the Mocotaugan site

	NISP	MNI	NISP Wt (g)	NSP Burned/Calcined
CLASS: MAMMALS	2	1	3.6	0/1
Horse, *Equus* sp.	1	1	3.1	0/1
Unidentified very large mammal	1	—	0.5	0/0
CLASS: BIRDS	6	2	0.2	0/6
Unidentified medium bird	5	1	0.1	0/5
Unidentified small bird	1	1	0.1	0/1
CLASS: FISH	42	8	17.4	0/23
Lake sturgeon, *Acipenser fulvescens*	34	3	15.5	0/22
Brown bullhead, *Ameiurus nebulosus*	1	1	0.4	0/0
Bullhead sp., *Ameiurus* sp.	1	—	<.1	0/0
Lake/round whitefish, subfamily Coregoninae	1	1	<.1	0/1
Walleye/sauger, *Sander* sp.	3	3	1.2	0/0
Subtotals identified fish	40	8	17.1	0/23
Unidentified fish	2	—	0.3	0/0
Unidentified vertebrates	6	—	0.6	1/4
Grand totals	56	11	21.8	1/34
Totals, identified below class	41	11	20.2	0/24
Percentage identified	73.2	—	92.7	—

the second half of the 19th century, when European American settlement and transportation infrastructure expanded in association with the development of the mining, lumbering, and fishing industries. During the latter period, mass-produced objects, such as iron tools, nails, glass, and ceramics, became much easier to obtain, and the archaeological data reflect this (Tables 1, 2, 3, 4). The abundance and weight of iron artifacts at the Big Hook site highlight this trend. The logging and fishing industries used sleighs for winter hauling, and worn iron runner shoes became available for reuse as pot hooks. Only a single, small S-shaped pothook, 13 cm long, was recovered from the earlier Sugar Trail site (Fig. 5*h*), while eight much larger pothooks were found at the Big Hook site (Fig. 9*a*). The discard or abandonment of so many intact pothooks may relate to construction of a boiling arch nearby that rendered them obsolete. In fact, sometime around 1900 the Corp family established a sugar camp (20MK328) that utilized a stone arch and flat pan about 375 m south southwest of the Big Hook site (Dunham and Branstner 1995).

Sheet-metal fragments indicate the use of both cupriferous and ferrous vessels at the three earlier camps investigated (20MK484, 20MK485, and 20MK510) (Table 10). Nodinens, from Mille Lacs, Minnesota, recalled that during the mid-19th century her mother also used both cupriferous and ferrous vessels for making sugar: "two or three big brass kettles that she had bought from the English trader and a few tin pails from the American trader" (Densmore 1979:122). There may have been a preference for cupriferous- over ferrous-metal vessels. Frost (1904:266) recounted that "the Indians used to say that sugar was better boiled in brass or copper kettles." Densmore (1979:124) mentions a brass kettle handed down for five generations used in a ceremony giving thanks for the first sugar of the season and other "first-fruits" ceremonies. Sheet-metal cooking-vessel fragments were not found at the Big Hook site (20MK523), but fragments of a cast-iron kettle were recovered.

The abundance of cut sheet-metal fragments likely results from vessel repair and the manufacture of tools or ornaments (Table 10). Lugs remaining on some fragments indicate that kettles were used as a source for this sheet metal (Tables 2, 3). At 20MK484, a concentration of small, cupriferous sheet-metal fragments suggests the presence of intensive metal working, and this was the

Table 9 Distribution of identified fish, minimum number of individuals (MNI), by size class

Fish Taxon	Size Class	20MK 484	20MK 485	20MK 510
Lake sturgeon, *Acipenser fulvescen*	Small	—	1	—
"	Medium	—	1	1
"	Large	1	1	1
"	>135≤145 cm TL	—	1	—
Northern pike/muskellunge, *Esox* sp.	>40≤48 cm SL	—	1	—
Lake/round whitefish, subfamily Corogoninae	>32≤40 cm SL	1	1	1
"	>40≤48 cm SL	—	1	—
"	>48≤56 cm SL	—	1	—
Lake trout, *Salvelinus namaycush*	>40≤48 cm SL	—	1	—
"	>48≤56 cm SL	1	1	—
"	>56≤64 cm SL	1	1	—
"	>64≤72 cm SL	1	1	—
"	>72≤80 cm SL	—	1	—
Black bass, *Micropterus* sp.	>32≤40 cm SL	—	1	—
Walleye/sauger, *Sander* sp.	>24≤32 cm SL	—	1	—
"	>32≤40 cm SL	—	1	—
"	>40≤48 cm SL	1	2	1
"	>48≤56 cm SL	1	1	1
"	>56≤64 cm SL	—	—	1
Freshwater drum, *Aplodinotus grunniens*	>48≤56 cm SL	—	1	—
"	>56≤64 cm SL	—	1	—
Total MNI	—	7	20	7

Note: SL=standard length; TL=total length.

only site where the sheet-metal assemblage included cupriferous fragments rolled into cone-shaped rivets (n=4) that were not attached to kettle fragments. Site 20MK485 included a circular hand-cut piece of cupriferous sheet metal resembling "washers," 2–3 cm in diameter, found in the blacksmith area at Fort St. Joseph in Ontario, where the smith recycled and repaired kettles (Light 1987:33). Although no microscopic examination was conducted, 13 sheet-metal fragments (8 ferrous and 5 cupriferous) exhibited possible edge wear.

The Big Hook site (20MK523) permits some broader comparisons of sugaring technology. By the mid-19th century European American operations in the Midwest and Northeast were adopting more energy-efficient means of sap reduction utilizing flat pans and enclosed arches (Fox et al. 1905; Keener et al. 2010; Babson 2011). This offered two distinct technological advantages: more efficient wood combustion within arches and increased evaporation rates due to the greater surface area of sap in pans. However, in the Upper Great Lakes area, kettle and open-fire boiling persisted into the 20th century, especially among people with Native American ancestry (Gilfillan 1901:71; Thomas 2001:159, 2005:301). Factors, such as available capital for purchasing equipment and desired production levels, no doubt affected the choice of evaporation technology, but the importance of sugaring in terms of family or community identity and social relations could also have affected these decisions. A desire to maintain the cultural context of sugaring could have led to the continuation of open-fire boiling, even if a homemade arch and pan were technically and financially feasible. Too large of a financial or time investment in sugaring might have interfered with other aspects of the seasonal round. In addition, during the mid-19th century it may not have made sense to invest in the construction of permanent sugaring facilities like arches given the uncertainties regarding continued access to the traditional land base in the face of removal threats.

Beside providing functional or technological information, archaeological data may be useful in addressing the racial categorization of sugar makers. In particular, two artifacts from 20MK510 highlight the ways material

Table 10 Sheet-metal fragments

Site	Metal Type	No./%	Wt. M (g)	Wt. SD (g)	Wt. Range (g)	No. Edge Wear	% Edge Wear
20MK484	Cupriferous	31/41	1.50	1.49	.01–6.17	1	3.2
20MK484	Ferrous	46/59	2.89	5.13	.06–26.01	3	6.5
20MK485	Cupriferous	7/33	6.85	8.21	.51–22.2	0	0
20MK485	Ferrous	14/67	11.60	13.80	.41–38.8	3	21.4
20MK510	Cupriferous	9/29	19.49	20.72	2.13–72.69	4	44.4
20MK510	Ferrous	28/71	2.65	4.45	.07–21.3	2	7.1

remains of a sugar camp can contradict racialized perspectives. At first glance, the *mocotaugan* blade (Fig. 7*b*) and the Victorian mourning pendant (Fig. 7*c*) would seem to represent opposing Native American and European influences. However, the association of these artifacts within a sugar camp could also represent the dynamic and creative nature of creolization. The *mocotaugan* is usually considered an Indian trait, even though it was used by most participants in the fur trade, and the term "Victorian" in most circumstances connotes "whiteness" (Bradley 1987:229; Jalbert and Jalbert 2003). The occurrence of these two artifacts within an assemblage probably produced by a single extended family makes it difficult to categorize the site based on racial or ethnic stereotypes. Bayliss and Bayliss (1938:162) illustrated the pitfalls of making mutually exclusive ethnic interpretations based on so-called "diagnostic" maple-sugaring traits: "[T]he pioneer settlers on St. Joseph (Island) adopted many of the methods of work and terms of speech of the Indians," and "housewives" there traded clothing or provisions for rectangular sheets of birch bark used for making sap-collection vessels.

Researchers often analyze faunal remains as potential indicators of ethnicity, but this can also can become problematic when interpretation goes from reconstructing practices to attributing identity (Carlson 2012). Wild species, especially fish, dominate the three older sugar camps (20MK484, 20MK485, 20MK510), and birds of prey are represented at one of them (20MK485) (Tables 6, 7, 8), showing continuity with earlier assemblages from around the Mackinac Straits attributed to Native Americans (McPherron 1967; T. Martin 1981; Carlson 2012). However, assigning an ethnic identity based on faunal remains from the sites analyzed here could obscure the complexity of lived experience suggested by ethnohistory. For example, members of extended Gros Cap families that observers might place in different ethnic categories, such as Mis-an-jean-qua and David Corp, worked together at the same sugar camps, eating the same food, and using the same material culture (Edmunds 1836; USBC 1870; Durant 1908; Corp [2009]). This situation was not unusual. After an exhaustive, but largely unsuccessful, search for distinctive faunal signatures revealing Native American individuals known to have resided in certain French households at 18th-century Fort Michilimackinac, Carlson (2012:70) concluded that a process she identifies as "culinary creolization" had thoroughly integrated Native American foodways based on wild species into the consumption patterns of all residents. In a sense, Native American traditions were harder to see when they were the rule rather than the exception. Ambiguous or even contradictory archaeological evidence of race or ethnicity is consistent with practices derived from both European and Native American sources, and people who self-identify based primarily on extended family and community connections. Over time, these connections provided the cultural resilience and adaptability that enabled some descendants of Gros Cap and Pointe Aux Chenes sugar makers to survive colonization and maintain indigenous identities (Durant 1908).

Conclusion

Based on comparisons with 18th- and 19th-century accounts, the archaeological characteristics of all four tested sites support their identification as sugar camps (Bain 1901; Quimby 1966; Corp [2009]). However, archaeology provides information not included in ethnohistorical sources, such as the details of a subsistence pattern focusing on fish, supplemented by small mammals and birds, and essentially without large mammals. These four sites also illustrate both cultural continuity and changes in sugar-making technology. Rather than adopting the pan-and-arch method, families living at Gros Cap and Pointe Aux Chenes adapted an older technology to changing social and economic circumstances. The concept of

indigenous creolization provides a balanced way to consider both European and Native American contributions to maple-sugaring practices during the 17th to 19th centuries. In the context of colonization, sugaring for both commodity production and as part of a traditional seasonal round of social and subsistence activities illustrates both agency and innovation.

Beside verifying site functions and providing new specifics on maple-sugaring practices, a combination of archaeological and historical data also addresses the racial categorization of producers. Outside observers described sugarers using dichotomous or trichotomous racial categories, but archaeological data and oral history offer a different perspective on the likely occupants of these four sites, even though their actual names are not known. When asked during a 1993 interview about differentiating families with Chippewa, Ottawa, and French Canadian ancestry based on language variations, Anishinaabe elder and former Pointe Aux Chenes resident Charles Shedowin (1993:36) refused to participate in what he viewed as an attempt at artificially "separating people" based on a single trait. In addition, he pointed out that, at Gros Cap and Pointe Aux Chenes, "just about everybody was related" (Shedowin 1993:45). When viewed as an outcome of the creolization process, archaeological evidence from the four sugar camps also reflects cultural cohesion and connection, even if some traits can be traced to diverse origins.

Using the more specific concept of indigenous creolization can also avoid imposing unwarranted new identities on people who practiced both Native American and European traditions, and does not impose outsider narratives on the self-identification or self-determination efforts of their descendants. "Perceived commonality" can be based on a number of other factors, and archaeologists may have become too focused on using ethnicity to define separate groups in colonial settings, given both the inherent methodological difficulties in doing so and the ease with which ethnic attributions become racialized (MacSweeney 2009; Andersen 2011). In fact, Murphy (2014:14–17) suggests many Great Lakes residents with Native American ancestry successfully resisted racialization by refusing to self-identify using racial terms or easily racialized ethnic terms. Many preferred describing themselves with reference to their occupations, geographic ties, clans, or extended families (Cleland 1992:39–40; Murphy 2009:2). By emphasizing ethnic "mixedness" or "hybridity," scholars can inadvertently reproduce colonial classifications (Andersen 2011:38). For example, Macdougall (2006:436) complains that many ethnohistorians have portrayed the Métis as a "'people-in-between,' hybrids torn between the worlds of their non-Native fathers and Indian mothers." This complaint could apply to members of any group subjected to hybridity narratives, regardless of the relative emphasis they place on various aspects of their heritage. Andersen (2011:48) provides a succinct reminder about the identity of "mixed" people: "they are whatever they called themselves." With this in mind, historical archaeologists might consider avoiding overly deterministic terms and attributions for the material culture of people whose self-identification practices were unrecorded or ambiguous.

An interpretive framework that acknowledges the dynamic process of creolization can make sense of diversity, or even contradiction, within a community, an extended family, or an archaeological assemblage (Gundaker 2000:127). This avoids "whole-culture" assumptions or implying a process that somehow results in groups less "pure" than their antecedents. Although he was critical of using the concept outside the Caribbean, Mintz (1998:119) described creolization as "culture building rather than cultural mixing or cultural blending," and this also summarizes what is represented by archaeological evidence for the development of Great Lakes maple-sugaring practices based on both European and Native American traditions.

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