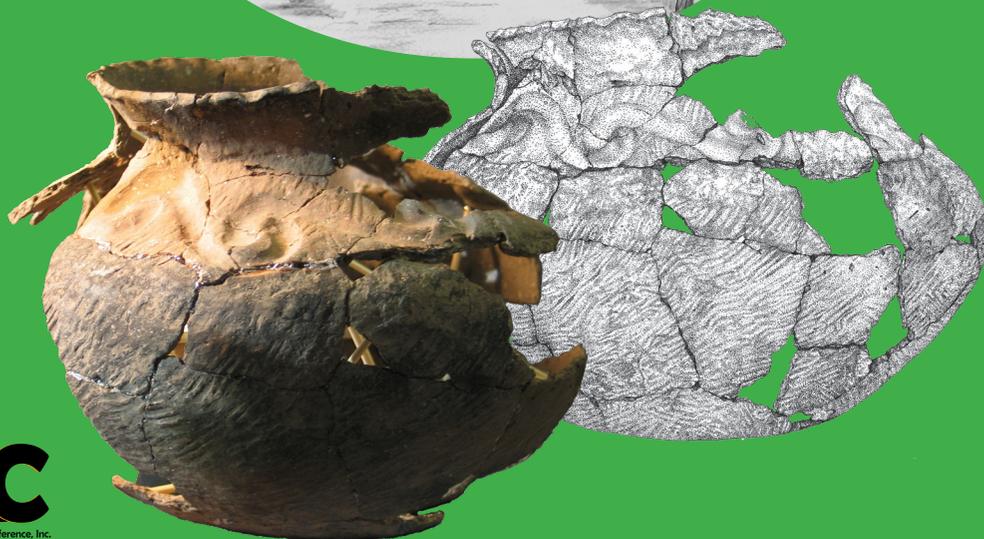




# OCCASIONAL PAPERS

Official Publication of the Midwest Archaeological Conference, Inc.





MIDWEST ARCHAEOLOGICAL CONFERENCE, INC.

# OCCASIONAL PAPERS

Number 4

Spring 2020

## CONTENTS

### **Life, Death, and Landscapes at Lake Koshkonong: Oneota Archaeology in Southeastern Wisconsin**

*EDITED BY*

*ROBERT J. JESKE, RICHARD W. EDWARDS IV, AND KATHERINE STERNER*

1. **New Perspectives from Lake Koshkonong**  
Robert J. Jeske, Katherine Sterner, and Richard W. Edwards IV 1
2. **Upper Mississippian Stone Tools and Community Organization**  
Katherine M. Sterner 27
3. **Identities in Clay: Displays of Group Identity on Pottery from Oneota Villages on Lake Koshkonong**  
Seth A. Schneider and Natalie A. Carpiaux 47
4. **Risky Landscapes: Agriculture and Risk Management in Upper Mississippian Societies**  
Richard W. Edwards IV 63
5. **Archaeofauna as Evidence for a Specialized Oneota Economy**  
Rachel C. McTavish 83
6. **The Social Landscape of Eleventh- to Fifteenth-Century Lake Koshkonong**  
Robert J. Jeske 103
- References 119

# OCCASIONAL PAPERS

## Editor

Thomas E. Emerson, Illinois State Archaeological Survey

## Editorial Assistant

Sarah E. Boyer, Illinois State Archaeological Survey

## Founding Editor

David S. Brose, Imprints from the Past, LLC

## Book Reviews Editor

Tamira K. Brennan, Southern Illinois University Carbondale

## Editorial Board

Susan M. Alt, Indiana University

Jane E. Baxter, DePaul University

Robert A. Cook, Ohio State University at Newark

John F. Doershuk, University of Iowa

Christopher J. Ellis, University of Western Ontario

Duane Esarey, Illinois State Museum

Robert J. Jeske, University of Wisconsin–Milwaukee

T. R. Kidder, Washington University in St Louis

Neal H. Lopinot, Missouri State University

George R. Milner, Pennsylvania State University

Michael Nassaney, Western Michigan University

Timothy R. Pauketat, University of Illinois

Mark R. Schurr, University of Notre Dame

## Aims and Scope

The Midwest Archaeological Conference Sponsored Symposium held at MAC, Inc. annual meetings is a forum for presentation of problem-oriented current thinking on key midwestern archaeological issues. The publication of such symposium proceedings in the *Occasional Papers* series serves to articulate how innovative breakthroughs and cumulative evidence may question previous interpretations and lead to a new understanding of the midwestern archaeological record.

## Style

*Occasional Papers* generally follows the conventions of American Antiquity with a few exceptions. For more specific information visit: [http://www.saa.org/Portals/o/SAA/Publications/StyleGuide/StyleGuide\\_Final\\_813.pdf](http://www.saa.org/Portals/o/SAA/Publications/StyleGuide/StyleGuide_Final_813.pdf) or contact the Editorial Assistant for more information.

## Society Membership

Individuals who wish to receive access to all *Occasional Papers* (and *MCJA* journals) can join the Midwest Archaeological Conference and receive access to the online-only *Occasional Papers* series as part of their annual membership. Visit <http://www.midwestarchaeology.org/> for details.

First Midwest Archaeological Conference Inc.'s *Occasional Papers* (ISSN 2372-9899) is published by Midwest Archaeological Conference, Inc. Each volume contains material from sponsored symposiums at past annual meetings on timely spatial or temporal issues that form special edited volumes of *Occasional Papers*.

**Copyright** © Midwest Archaeological Conference Inc. 2020. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the written permission of the copyright holder. Requests for such permissions must be addressed to the *MCJA* Editor or Assistant Editor. For more information, visit <http://www.midwestarchaeology.org/home>.

## Disclaimer

Responsibility for opinions and statements contained in the articles, notes, correspondence, reviews, and discussion is that of the authors, and not of the editors, Midwest Archaeological Conference.

## Online Publication

The full text of this series is available via our online platform at <http://www.midwestarchaeology.org/home>. Access to the online version is available to current MAC members only.

## Cover Image

Village scene by Sara Grabarec. Pottery vessel photo by Seth Schneider. Pottery vessel drawing by Lisa Mesirow. Used with permission.

# 1

## New Perspectives from Lake Koshkonong

Robert J. Jeske,<sup>1</sup> Katherine M. Sterner,<sup>2</sup> and Richard W. Edwards IV<sup>1, 3</sup>

<sup>1</sup>DEPARTMENT OF ANTHROPOLOGY, UNIVERSITY OF WISCONSIN–MILWAUKEE; <sup>2</sup>CULTURAL RESOURCE MANAGEMENT, UNIVERSITY OF WISCONSIN–MILWAUKEE; <sup>3</sup>COMMONWEALTH HERITAGE GROUP, MILWAUKEE

Historically, the Koshkonong Locality has played a pivotal role in our understanding of Oneota archaeological culture. To this day, discussions of the topic are heavily influenced by Hall's (1962) seminal work at Carcajou Point. Hall's research had a profound impact on succeeding scholars (e.g., Overstreet 1976), who have essentially defined Wisconsin Oneota. However, over the last few decades, ongoing research in the Koshkonong Locality and beyond has necessitated that we modify and, in some cases, significantly alter or abandon some of our long-held assumptions about Upper Mississippian lifeways in the eleventh through fifteenth centuries AD. New data, new methods, and new theoretical perspectives have changed our perspective sufficiently that we now need to reconceptualize the terms *Oneota* and *Upper Mississippian* to include a more nuanced discussion of identity, interregional politics, subsistence, and trade. This introduction will provide the historical and theoretical background for the subsequent articles in this volume.

**KEYWORDS** Oneota; Lake Koshkonong; Midwest Chronology

### Introduction

This volume is not a conclusion of research into Oneota occupations in southern Wisconsin. In fact, it is barely an introduction. University of Wisconsin–Milwaukee (UWM) faculty and students have put in more than 20 years of research focused on a few sites in a small region and have recovered a voluminous amount of data. We have just begun to discern patterns that will need much more scrutiny and testing

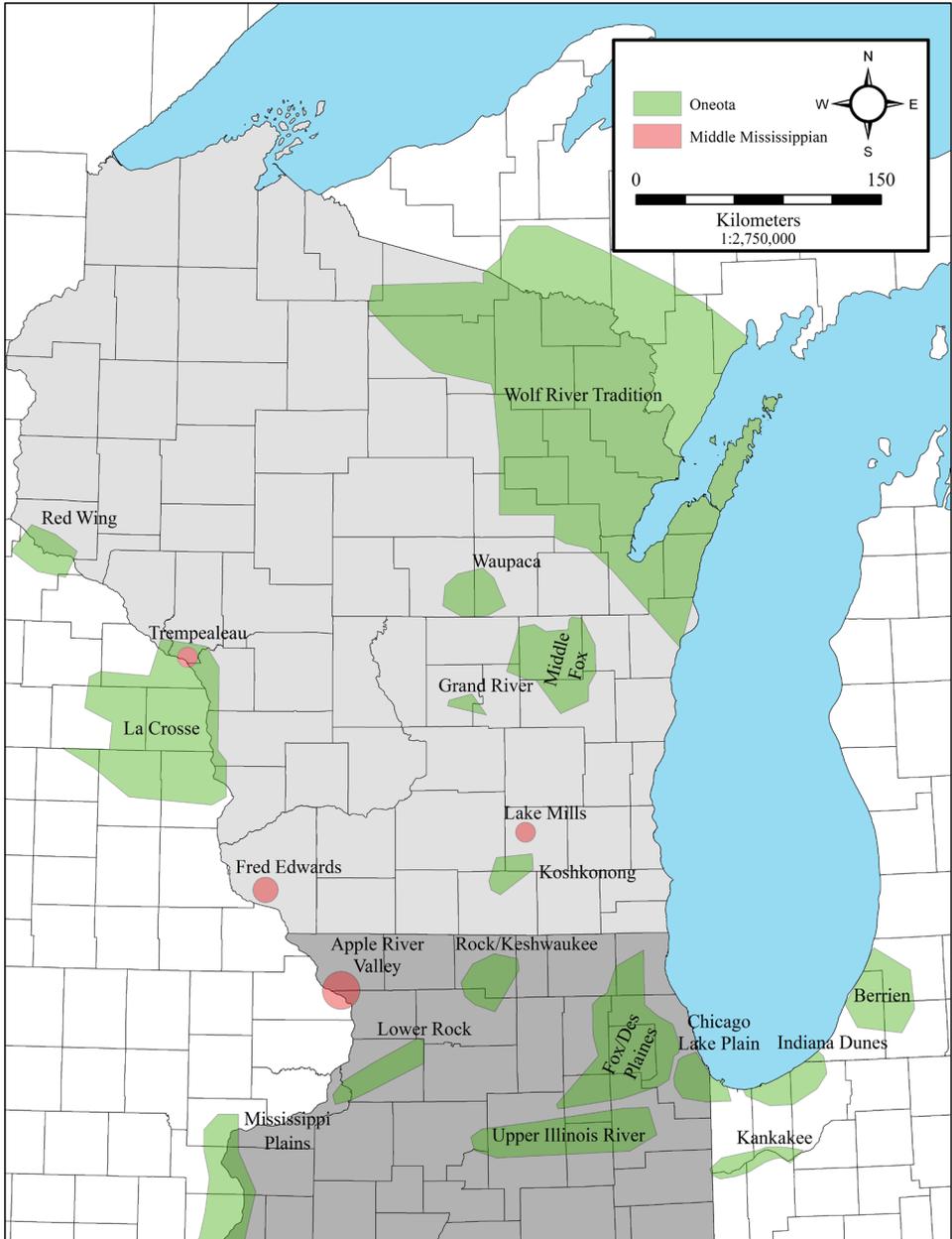
before we can be confident that we see them clearly. This introduction has two primary purposes. The first is to provide a history of research at Oneota sites in the Koshkonong Locality. The second is to set the background context for the sites that will be discussed throughout this volume.

It has long been noted that Wisconsin Oneota material culture tends to cluster at distinct geographic areas across the landscape, which have been termed localities (Overstreet 1997; Willey and Phillips 1958). For more than 80 years, Lake Koshkonong has been recognized as one such locality (Figure 1.1; McKern 1945). The Koshkonong Locality is unusual in its degree of isolation, separated by 70 km from other contemporaneous Oneota localities (Overstreet 1997; Schneider 2015). The sites are highly clustered along a small stretch of the northwest shore of the lake (Figure 1.2). Although it is certain that some Oneota ceramic sherds exist on archaeological sites at other points around Lake Koshkonong, there is little evidence for other extensive Oneota occupations in the immediate region (Goldstein and Richards 1991; Richards and Jeske 2002). Goldstein and Richards (1991:203) note that UWM's large-scale systematic surveys of the region indicated that "sites of every other time period are found in relative abundance; unless there is something very unusual about Mississippian sites, it is assumed that the lack of sites in some way represents the real prehistoric distribution." Continued regional survey over the last three decades reinforces their interpretation. An important caveat is the location of four small multicomponent sites containing some Oneota ceramics on the Yahara River, 20–30 km northwest of Lake Koshkonong (Haas et al. 2017). The nature of these sites and their relationship to the Koshkonong Locality are unclear. It is our current position that these sites represent seasonal special-purpose camps, likely related to the villages in the Koshkonong Locality, but more work is needed to definitively ascertain the relationship between the Lake Koshkonong and Yahara River sites.

Even less clear has been a robustly supported interpretation of how people between the eleventh and fifteenth centuries made use of the locality or how they interacted with their neighbors. The lack of a long-term, sustained research program at Lake Koshkonong until the twenty-first century has stunted our understanding of how the larger Oneota archaeological phenomenon relates to excavated archaeological sites in southeastern Wisconsin.

Modern Oneota research in southeastern Wisconsin lies on the foundation of Robert Hall's (1962) seminal volume. His analysis of the ceramic assemblage from Carcajou Point established the accepted typology for eastern Wisconsin Oneota for more than 50 years—defining types such as Koshkonong Bold, Carcajou Curvilinear, and others. His three radiocarbon dates from the site were the first in the region. His work established a framework for Oneota origins and dispersion and provided reasoned interpretations of Oneota social organization.

At Carcajou Point, Hall (1962:17–18) tentatively identified two types of domestic structures that he thought were similar to houses used by a number of Wisconsin historic tribes: one he interpreted as a "gabled bark summerhouse" and another as a possible "wigwam." He also found a wall-trench structure he compared favorably to Middle Mississippian houses found at Aztalan and in the American Bottom (Figure 1.3). Despite the prominence of Carcajou Point, surprisingly little research has been conducted at the site since 1959. A number of smaller projects have been



**FIGURE 1.1.** Oneota and Middle Mississippian localities in Wisconsin.

undertaken, providing relatively small data sets; most importantly, they yielded five additional radiocarbon dates that have enhanced regional chronology (Table 1.1; Figure 1.4; e.g., Birmingham 2006; Brubaker and Goldstein 1991; Gaff 1998; Richards et al. 1998; Rosebrough and Broihahn 2005).

Hall's (1962:13) interpretation of the "Koshkonong Focus" and its relationship to the larger Oneota Tradition (Hall 1962:100) has been supplemented by

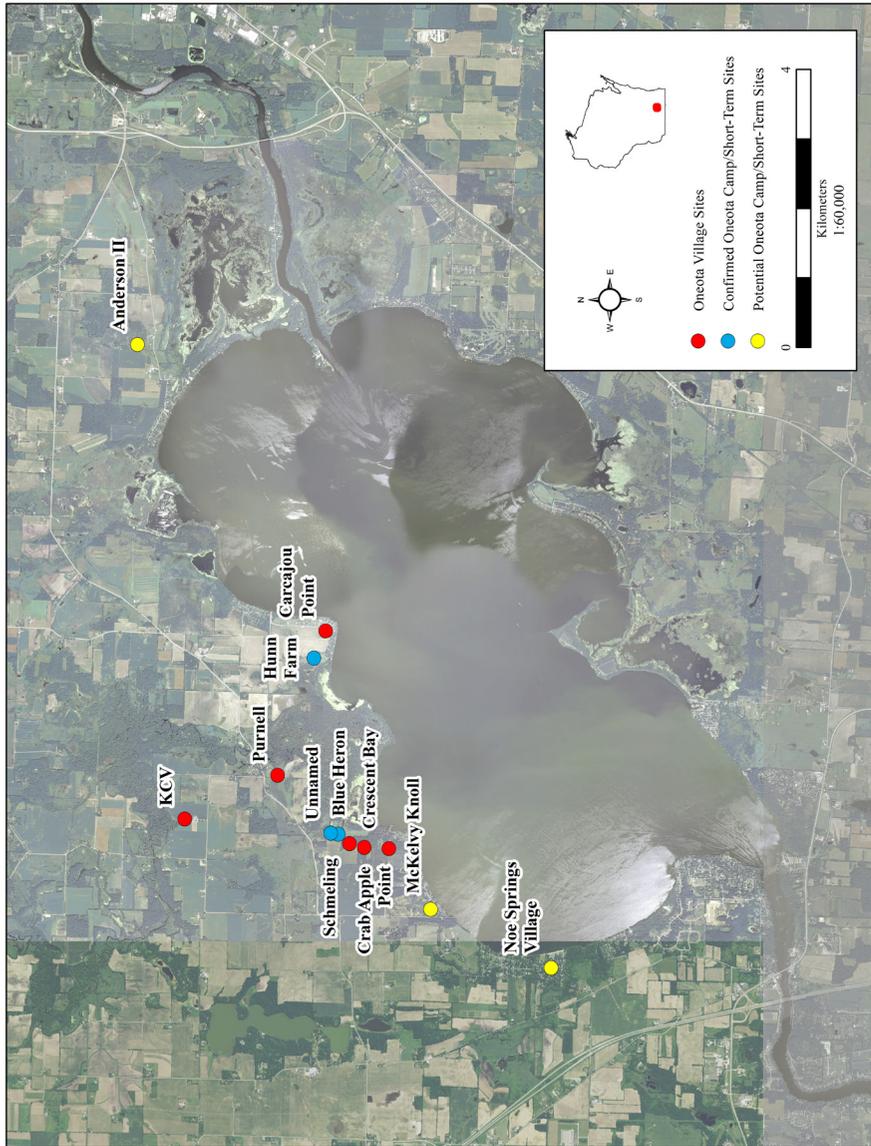
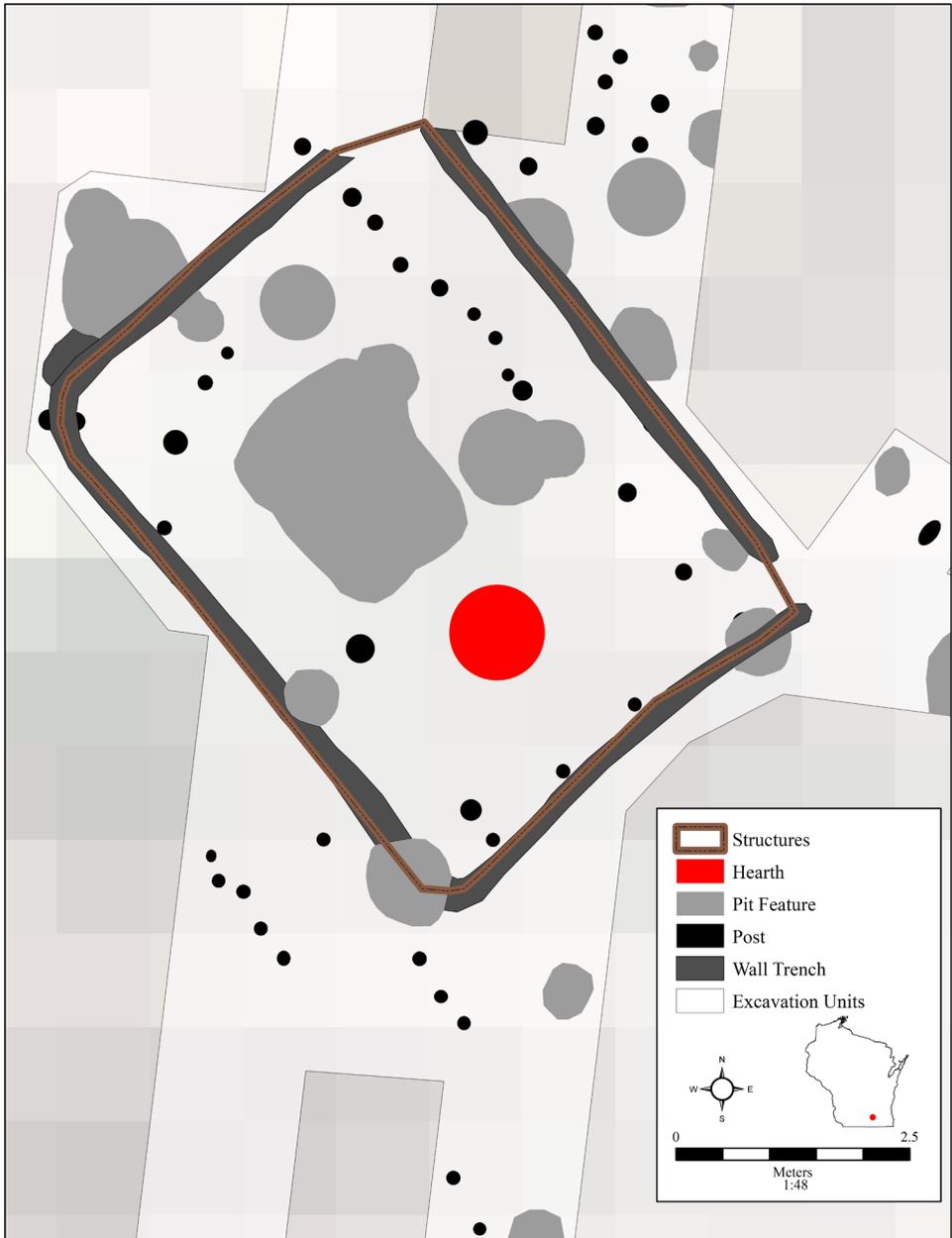


FIGURE 1.2. Locations of Oneota sites around Lake Koshkonong (background imagery from Wisconsin View 2017).



**FIGURE 1.3.** Wall-trench style structure at Carcajou Point (after Hall 1962:Plate 4).

Overstreet's (1997) authoritative evaluation of the variation between and similarities of Oneota material culture across Wisconsin localities (e.g., Gibbon 1969a; J. Jeske 1927; Mason 1966; Overstreet 1976, 1978; Peske 1966). In addition, the extensive work conducted at the end of the twentieth century in the La Crosse Locality (e.g., Arzigian et al. 1989; Gallagher et al. 1985; O'Gorman 1993) has left an indelible stamp on all work conducted on Oneota sites throughout the state.

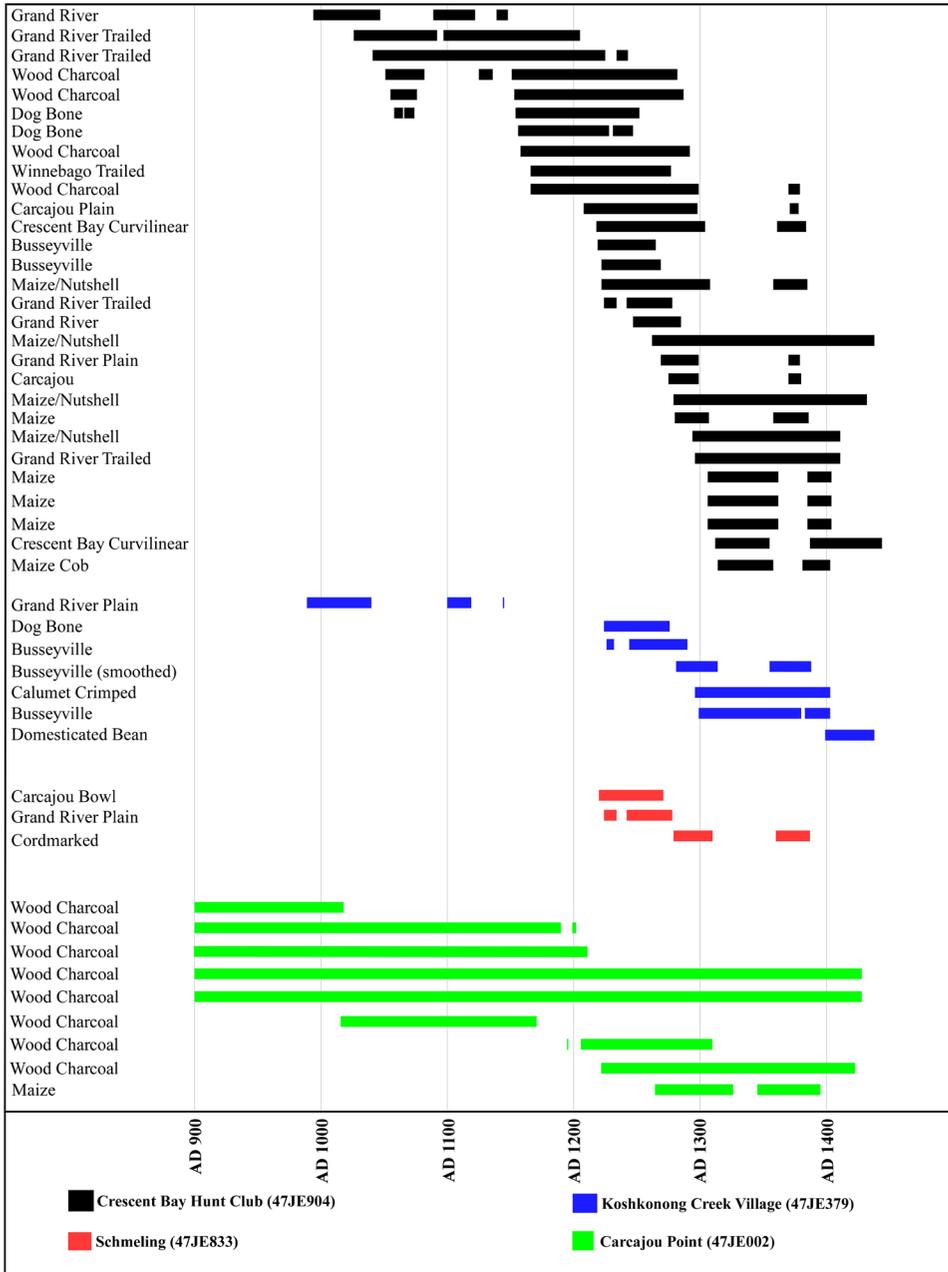


FIGURE 1.4. Two-sigma calibrated radiocarbon dates from the Koshkonong Locality.

The lack of a systematic program centered on eastern Wisconsin Oneota sites resulted in an underwhelming appreciation of the region’s potential. For decades, the Hall/Overstreet and La Crosse interpretations of Oneota were accepted as encompassing all Wisconsin (e.g., Boszhardt 2004; Brown and Asch 1990; Green 2014; Overstreet 2001). Despite some debate over chronology (e.g., Benchley 1997;

TABLE 1.1.

## RADIOCARBON DATES FROM THE KOSHKONONG LOCALITY.

Site	Context	Material	Age BP	Error Term	1 $\sigma$ AD	%	2 $\sigma$ AD	%	Reference
KCV	F12-06 zL	Bean	520	20	1410–1427	100	1399–1438	100	Edwards 2017
CBHC	F04-14 Z2	Maize/ Nut	530	40	1329–1340 1369–1434	17 83	1312–1359 1387–1444	30 70	Richards and Jeske 2015
CBHC	F12-53	Maize Cob	580	15	1322–1347 1392–1403	72 28	1314–1357 1388–1409	68 32	Jeske et al. 2017
CBHC	F04-14 z6	Residue	590	40	1310–1360 1387–1405	73 27	1296–1415	100	Richards and Jeske 2015
CBHC	F00-15	Maize	595	15	1315–1331 1338–1355 1389–1397	38 42 20	1306–1363 1385–1404	77 23	Sternier 2018
CBHC	F14-01	Maize	595	15	1315–1331 1338–1355 1389–1397	38 42 20	1306–1363 1385–1404	77 23	Sternier 2018
CBHC	F02-27	Maize	595	15	1315–1331 1338–1355 1389–1397	38 42 20	1306–1363 1385–1404	77 23	Sternier 2018
CBHC	F00-06	Maize/ Nut	600	40	1306–1363 1385–1400	79 21	1294–1411	100	Richards and Jeske 2015
CBHC	F00-11	Maize/ Nut	600	70	1300–1368 1381–1406	74 26	1279–1432	100	Richards and Jeske 2015
KCV	F12-06 zB	Residue	605	20	1307–1328 1341–1362 1385–1395	41 40 19	1299–1370 1380–1403	78 22	Edwards 2014
KCV	F14-29 zb	Residue	610	30	1302–1328 1341–1367 1382–1395	40 40 20	1296–1403	100	Edwards 2017
CBHC	F00-26	Maize/ Nut	620	80	1294–1333 1337–1398	39 61	1262–1438	100	Richards and Jeske 2015
Carcajou	F15	Wood	660	80	1275–1327 1342–1395	50 50	1222–1423	100	Richards et al. 1998
KCV	FF14-19	Residue	660	20	1287–1303 1366–1383	50 50	1281–1314 1356–1388	50 50	This Article
CBHC	F17-05 zA	Maize	665	15	1287–1299 1370–1380	58 42	1282–1307 1362–1385	56 44	Sternier 2018
Schmeling	—	Residue	670	20	1284–1299 1369–1380	65 35	1279–1310 1360–1387	59 41	This Article
Carcajou	F3	Maize	680	40	1276–1305 1363–1385	63 37	1263–1325 1344–1394	60 40	Birmingham 2006
CBHC	F02-01	Residue	690	15	1280–1292	100	1275–1299 1370–1380	93 7	Richards and Jeske 2015
CBHC	F0-14	Residue	700	20	1277–1290	100	1269–1299 1370–1379	95 5	Richards and Jeske 2015
Carcajou	F12	Wood	700	70	1255–1318 1352–1390	65 35	1195–1195 1206–1410	1 99	Richards et al. 1998
CBHC	F00-21	Maize/ Nut	720	40	1257–1297 1375–1375	99 1	1222–1308 1361–1386	89 11	Richards and Jeske 2015
CBHC	F04-14	Residue	730	40	1254–1296	100	1218–1304 1365–1384	94 6	Richards and Jeske 2015
KCV	F14-29	Residue	740	25	1263–1281	100	1226–1232 1244–1290	2 98	Edwards 2017
CBHC	F04-35	Residue	745	20	1264–1278	100	1247–1286	100	Richards and Jeske 2015

(continued)

TABLE 1.1, CONTINUED.

## RADIOCARBON DATES FROM THE KOSHKONONG LOCALITY.

Site	Context	Material	Age BP	Error Term	1 $\sigma$ AD	%	2 $\sigma$ AD	%	Reference
CBHC	F02-40	Residue	750	40	1227–1231 1245–1284	6 94	1208–1298 1371–1378	99 1	Richards and Jeske 2015
CBHC	F68-01	Wood	760	50	1224–1280	100	1166–1299 1370–1379	98 1	Bender et al. 1970
Schmeling	—	Residue	765	15	1257–1273	100	1224–1234 1242–1278	6 94	Richards and Jeske 2015
CBHC	F10-29	Residue	765	15	1257–1273	100	1224–1234 1242–1278	6 94	Jeske 2010
KCV	F17-02	Dog Bone	770	20	1247–1274	100	1224–1276	100	This article
CBHC	F68-06	Wood	780	50	1217–1277	100	1159–1293	100	Bender et al. 1970
CBHC	F04-03	Residue	785	15	1225–1232 1224–1264	21 79	1222–1269	100	Richards and Jeske 2015
Schmeling	—	Residue	785	20	1224–1234 1242–1265	28 72	1220–1271	100	Richards and Jeske 2015
CBHC	F10-98	Residue	795	15	1224–1235 1241–1259	37 63	1219–1265	100	Richards and Jeske 2015
CBHC	F06-63	Residue	800	40	1213–1268	100	1166–1277	100	Richards and Jeske 2015
CBHC	F68-10	Wood	800	50	1192–1997 1205–1272	4 95	1055–1076 1153–1287	2 98	Bender et al. 1970
CBHC	F68-09	Wood	810	50	1189–1266	100	1051–1082 1128–1133 1151–1284	4 1 95	Bender et al. 1970
CBHC	F10-14	Dog bone	854	21	1169–1177 1181–1214	20 80	1156–1228 1231–1247	96 5	Edwards 2017
CBHC	F10-11	Dog bone	856	24	1168–1216	100	1058–1065 1066–1074 1154–1252	1 1 98	Edwards 2017
CBHC	F04-14	Residue	880	40	1050–1082 1228–1135 1151–1216	27 5 68	1037–1225 1234–1243	98 2	Richards and Jeske 2015
Carcajou	—	Wood	890	80	1043–1103 1118–1216	38 61	1016–1271	100	Hall 1962
CBHC	F04-15	Residue	920	40	1043–1104 1118–1158	60 40	1026–1192 1197–1205	98 2	Richards and Jeske 2015
Crab Apple	Oneota Feature	Wood	980	55	999–1002 1012–1053 1079–1152	1 38 61	909–911 969–1190 1198–1203	<1 99 <1	Spector 1975
CBHC	F04-22	Residue	990	20	1016–1040 1110–1115	92 8	994–1047 1089–1122 1139–1148	78 19 3	Richards and Jeske 2015
Carcajou	F17	Wood	990	250	777–791 804–842 860–1259	3 7 90	581–1428	100	Hall 1962
KCV	F12-01	Residue	1000	20	999–1001 1013–1035	3 97	989–1044 1100–1119 1144–1145	93 6 0	Edwards and Spott 2012
Carcajou	F5	Wood	1010	70	969–1053 1079–1152	60 40	887–1190 1199–1202	99 <1	Richards et al. 1998
Carcajou	F8	Wood	1020	80	900–921	9	778–790	1	Richards et al. 1998

All dates calibrated with Calib 7.0 (Stuiver et al. 2013).

Boszhardt 1998, 2004; Overstreet 2001), the elision of regional differences and a singular grand narrative of Wisconsin Oneota dominated publications during the late twentieth century.

Aside from Hall's work at Carcajou Point, limited excavations were conducted at other sites in the region. The first known excavation at the Crescent Bay Hunt Club (CBHC) was a short University of Wisconsin–Madison field school directed by David Baerreis, who uncovered one posthole-wall structure in 1968 (Gibbon 1969b). In addition, four radiocarbon dates from features at the site were published in *Radiocarbon* (Bender et al. 1970). At least one master's thesis was produced from the 1968 CBHC data (Fortier 1972).

Janet Spector excavated at the adjacent Crab Apple Point site in 1973 (Spector 1975). However, she focused on the historical component at the site. Only a small portion of her work concerned the Oneota component, which remains poorly understood to this day. She obtained one radiocarbon date from a feature with Oneota pottery at the site.

Yet, over time, archaeological data were collected that showed significant variation across the eleventh- through fifteenth-century landscapes of Wisconsin, including Lake Koshkonong (see Figure 1.2). In addition to the small-scale excavations already discussed, UWM began a long-term, systematic survey of Jefferson and nearby counties. The survey project was focused on Aztalan's relationship to other sites (Goldstein 1979) and provided updated information on some of the Oneota sites in the region surrounding Lake Koshkonong (e.g., Hanson 1996; Musil 1987; Rodell 1984, 1987).

## Program in Midwestern Archaeology Research

UWM began a long-term program of systematic field school–based excavations at the Koshkonong Locality in 1998. To date, the research includes a full 10 field seasons of excavation at CBHC and multiple smaller survey and mapping projects. Additional excavations have been conducted at other Oneota sites in the locality: one field season each at Carcajou Point and Blue Heron, three field seasons at Schmeling, and five at Koshkonong Creek Village (KCV). Each of the field schools also included survey of sites in the region, including apparent village sites Crab Apple Point and Purnell, as well as several smaller Oneota sites. The materials from the Koshkonong Locality became the basis for UWM's Program in Midwestern Archaeology (PIMA) research in the region and the primary research presented in the following articles. In this introduction, we describe the background and history of the sites and provide the basic regional background.

## The Locality

The Koshkonong Locality is underlaid by loess and calcareous glacial till of varying thicknesses but averaging approximately 100 m (Alhakimi 2002; Black et al. 1970;

Kolb 1987:128). Terminal, end, and ground moraines surround the region and are underlain by a diverse set of sandstone, shale, limestone, and dolomitic bedrocks (Figure 1.5). Overall, the region is poor in exposures of lithic raw material. Several small outcrops of limestone and dolomites are exposed along the western shore of Lake Koshkonong, and there is an exposure of Waterloo quartzite 20 km north. A number of small outcrops exposing members of the Galena, Platteville, and Oneota Formations are located 40–60 km to the west, southwest, and northwest (Ostrom 1970, 1978). Maquoketa shale and Niagaran limestone outcrop in small areas 70 km to the northeast (Allen 1980; Stieglitz and Allen 1980; Young and Batten 1980).

Lake Koshkonong is a large, shallow impoundment of the Rock River, originally dammed by the Johnstown and Milton moraines at the end of the Pleistocene (Figure 1.6; Alhakimi 2002; Fenneman 1910). Covering 43 km<sup>2</sup>, it is the eighth largest lake in Wisconsin, but it is very shallow, with a mean depth of only 1.5 m and a maximum depth of roughly 2 m, although in past times portions of the lake were deeper (Lapham 1855:34). The lake is surrounded by numerous springs; its volume is now maintained by the Indianford Dam, located south of the lake (Wisconsin Department of Natural Resources [WDNR] 2005). Despite the continual manipulation of water levels by modern developments, Lake Koshkonong's current size and shape are only slightly different from those noted in documents from the early nineteenth century, such as the maps of Public Land Surveys of the General Land Office (Figure 1.7).

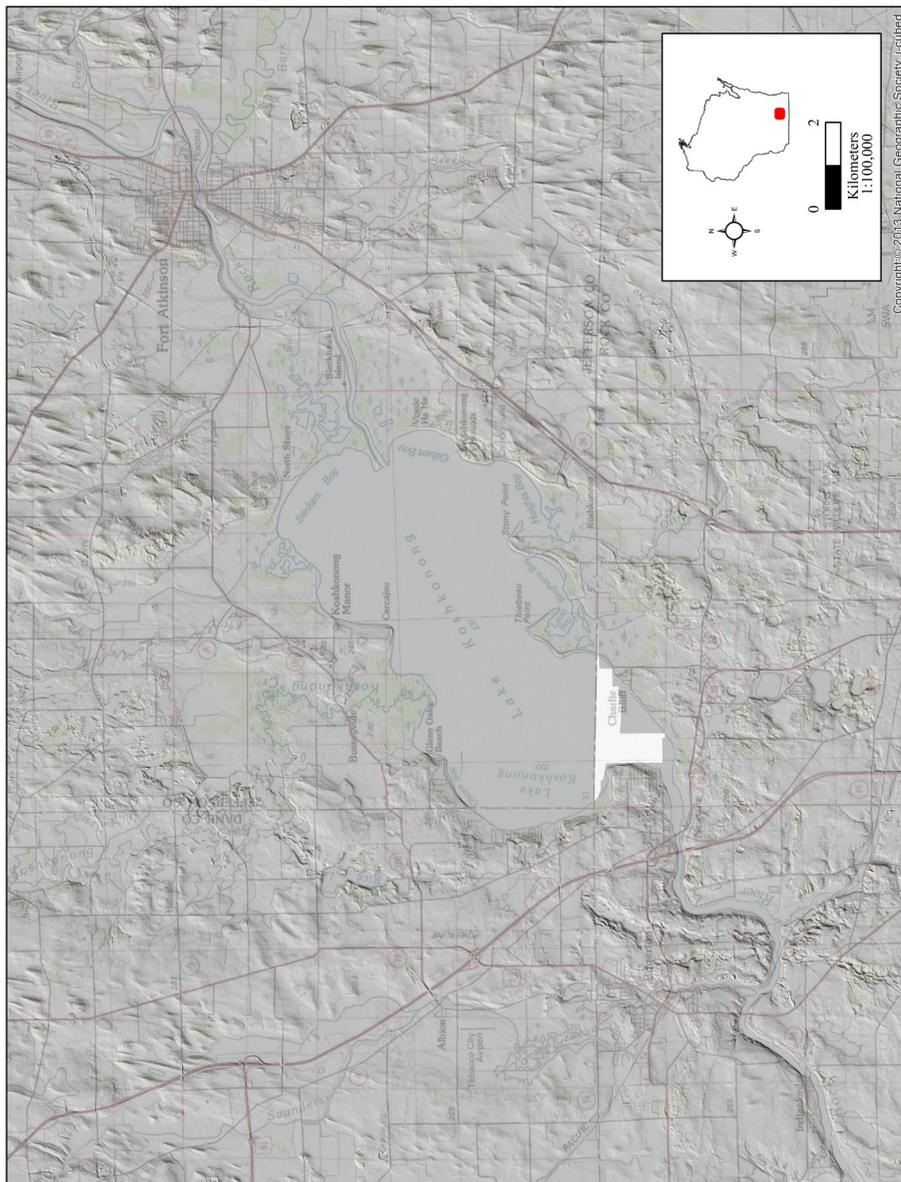
Before the dam was built circa 1851, the shallow waters and the flow of the Rock River within the lake made for an excellent wild-rice environment, as well as a productive fishery and waterfowl area:

According to the report of Capt. T. J. Cram, there is a rapid current, extending about six hundred feet into the lake, with a depth of water of only from two to three feet. In the other portion of the lake, on the usual channel or track for boats and rafts, the water is 4–12 feet deep. At the time of our visit (July 1850), wild rice<sup>t</sup> was growing abundantly over almost its whole surface, giving to it more the appearance of a meadow than a lake. Fish and mollusks also abound in its waters, finding plenty of food in the warm mud beneath, and among the roots and stems of the grass and rushes [Lapham 1855:34–35].

The wild-rice beds were at that time a regular resource for the Winnebago (Ho-Chunk), and threshing pits were a common sight around the lake (Stout and Skavlem 1908). The dense wild-rice beds also made the lake a renowned destination for hunting waterfowl, particularly canvasback ducks. However, after more than 30 years of living along the northwest shore of the lake, naturalist Thure Kumlein noted the damage that the dam and other Euro-American activities had done to its ecology:

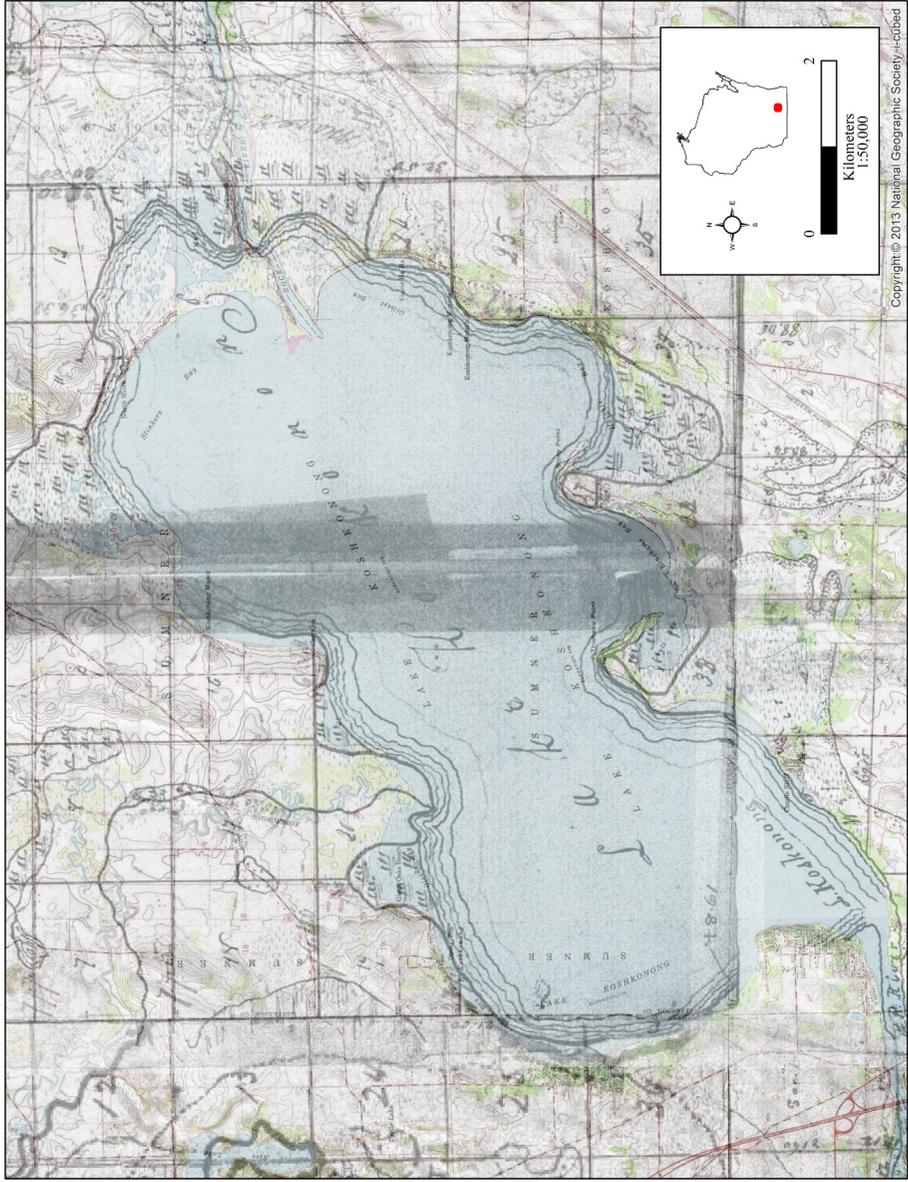
The lake . . . used to be a great favorite place for ducks, and especially the far-famed Canvassback (*Aythya vallisneria*). . . Geese, cormorants and white pelicans were also very numerous . . . the great blue heron, the large white heron, the snowy heron, the night heron, and the least heron, six species of the plover family and Wilson's *Phalarope*, the most bountiful of all our waders, was in





Copyright © 2013 National Geographic Society. Included

**FIGURE 1.6.** Landscape around Lake Koshkonong (background from ESRI 2013, National Geographical Society topographic map; Lidar Hillshade from Wisconsin Department of Natural Resources [WDNR] 2019).



**FIGURE 1.7.** Prehistoric vegetation and General Land Office map of Lake Koshkonong (Source: Wisconsin Board of Commissioners of Public Lands 2017; Edwards 2017; background image from ESRI 2013).

abundance. . . . [T]he birds have either greatly diminished in number or found other places where they are less disturbed, as now-a-days but few visit the lake compared with what they did only ten years ago. . . . As for the fish in the lake, the time is past when twenty-eight to thirty-five pound pickerels can be found, or twenty-five pound catfish. Bullheads and perch, sunfish, garpikes and dogfish are common yet; but the pike, pickerel, bass, redhorse, sucker and catfish are not near as plentiful as formerly [Kumlein 1877:629–630].

Moving away from the shoreline, the landscape on the east side of the lake is low and marshy, rising to a series of kettles and moraines; to the north and south are low rolling hills. On the west, a long limestone ridge rises 8 m above the marshes and shoreline of the lake, although the rock is only exposed in a few places. How much it would have outcropped prehistorically is not clear since today much of the rise is covered in colluvial wash from the agricultural fields above it. Continuing west, the terrain rises toward a low rolling landscape (see Figure 1.6).

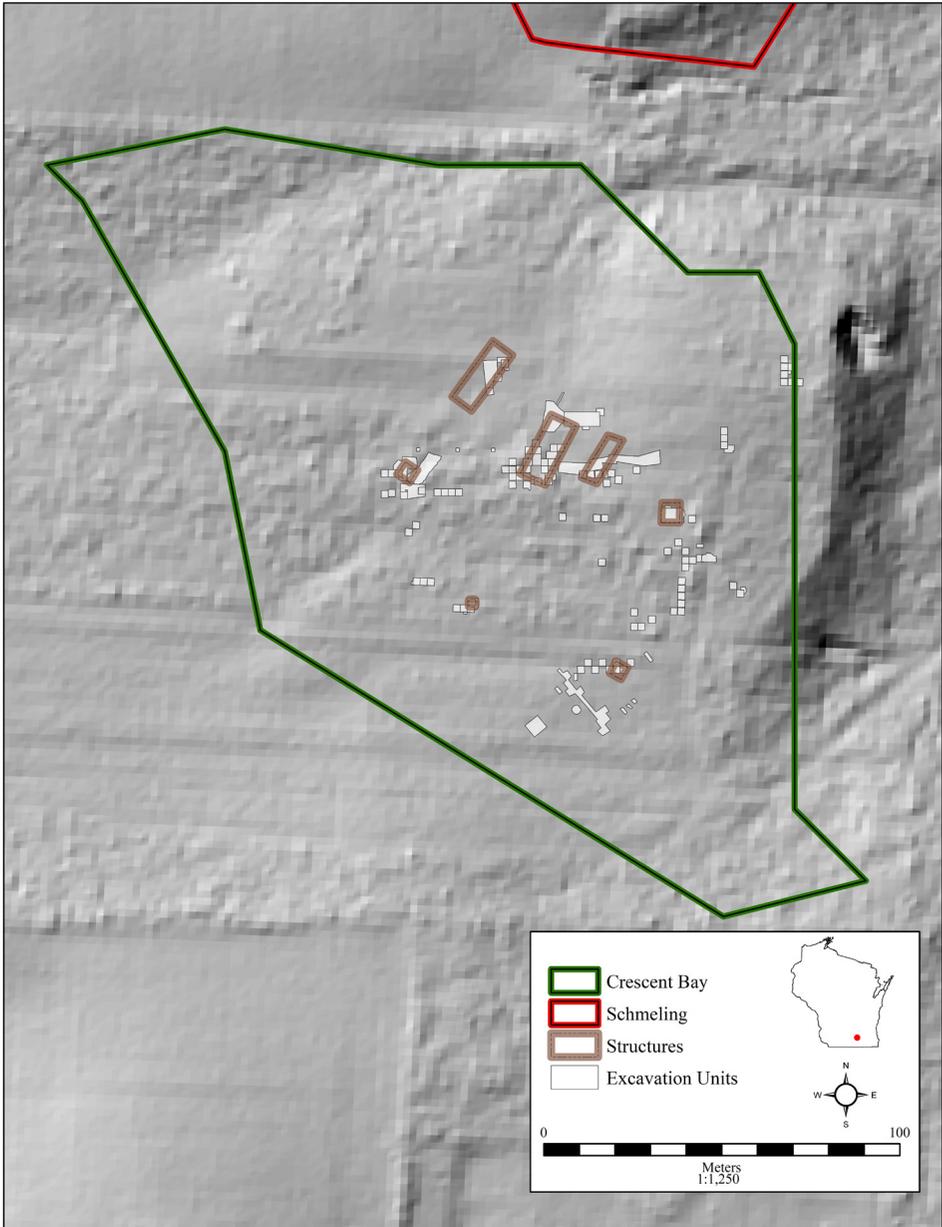
Aside from historical anecdote, the notes and maps of the Public Land Survey undertaken by the General Land Office in the 1830s provide evidence for the richness of the region surrounding the lake (see Figure 1.7). The presettlement vegetation of the region was a mixed set of environments and ecological zones. Significant areas of wetlands surrounded the lake, prairie dominated as one moved west, and mixed deciduous forests were interspersed with oak savanna across the landscape. Accessible plant resources included wild rice, bulrush, cattail, acorns, hickory and hazel nuts, numerous greens and seed-bearing plants such as chenopodium, and a wide variety of fruits. Significant areas of the region are well suited to maize, squash, and bean agricultural production. Animal resources included deer, elk, bison, raccoon, squirrel, otter, muskrat, and other mammals; waterfowl, passerines, and other birds; and multiple species of turtles, amphibians, fish, and small reptiles (Edwards 2010, 2017; Goldstein and Kind 1983; Jeske 1999a; Jeske and Hunter 2000).

## The Koshkonong Locality Sites

The Koshkonong Locality contains approximately nine sites with confirmed Oneota ceramic assemblages. With nearly 10% of the site excavated, CBHC is the most thoroughly sampled Oneota occupation (Figure 1.8). KCV, Carcajou, Point, Schmeling, and Crab Apple Point have seen, at most, a few percent of their areal extent excavated (Figure 1.9). Other possible village sites, such as Purnell, are only known from survey data. Nonvillage sites (e.g., Blue Heron) appear to be more ephemeral and have seen limited-to-no excavations. The data from this locality, thus, are almost entirely derived from CBHC, KCV, Carcajou Point, and Schmeling.

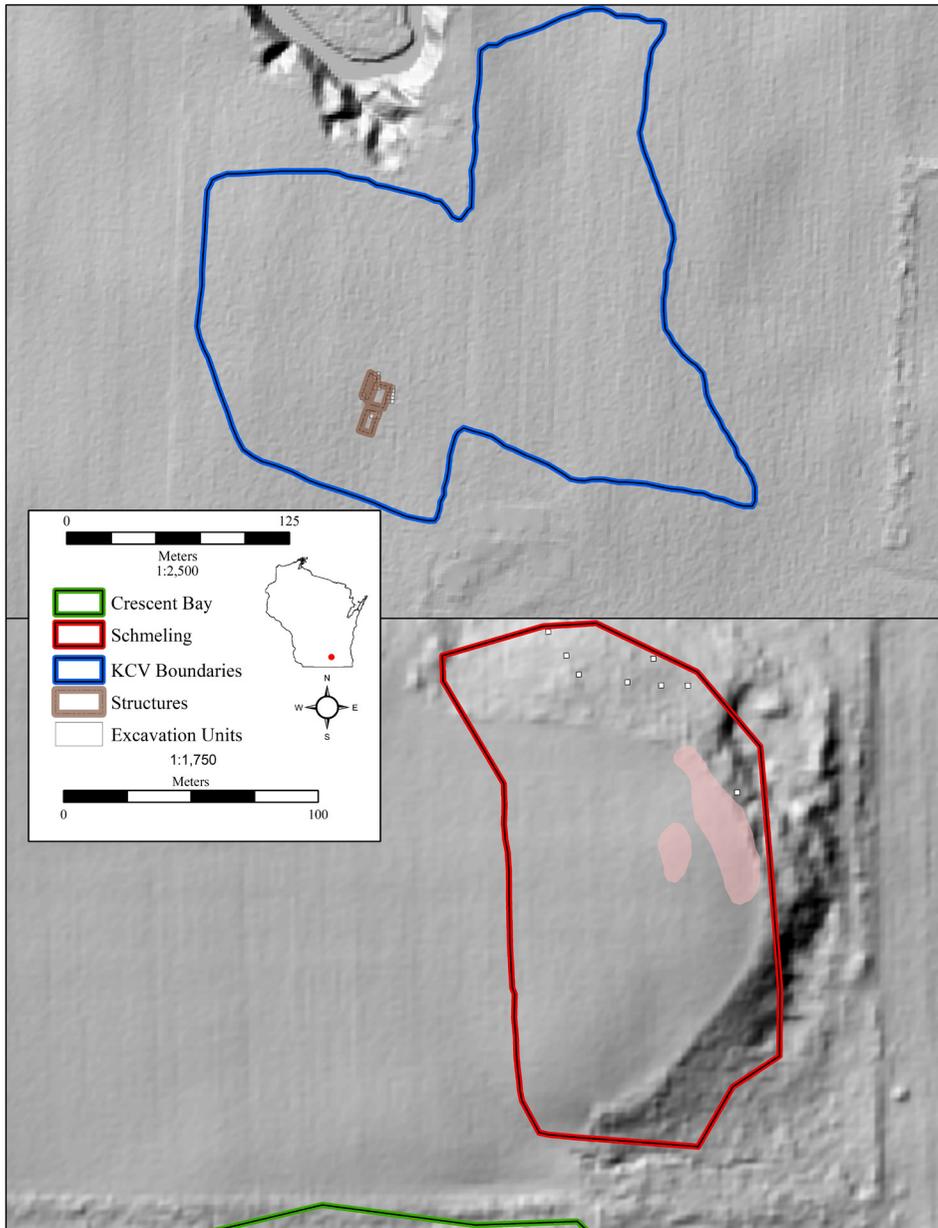
### *Crescent Bay Hunt Club (47E904)*

The Crescent Bay Hunt Club site covers 2 ha and sits atop the 8 m limestone ridge overlooking marshy flatlands flanking the lake, directly between the Schmeling and Crab Apple Point sites (see Figure 1.8). Nearly 2,500 m<sup>2</sup> have been exca-



**FIGURE 1.8.** Location of excavations and structures at the Crescent Bay Hunt Club (47JE904; Lidar Hillshade source WDNR 2019).

vated, uncovering more than 150 pit features and over 500 post molds. CBHC is a single-component site; of the more than 40,000 sherds recovered from 1998 to 2004, only 26 sherds were identified as non-Oneota (Schneider 2015). Formal analysis of ceramics from later excavations is still in progress, but to date, no other non-Oneota materials have been identified from the site. Faunal and floral data



**FIGURE 1.9.** Location of excavations and structures relative to site boundaries: (*top*) KCV and (*bottom*) Schmeling (Lidar Hillshade source WDNR 2019).

are consistent with a year-around occupation. Based on Bayesian analyses of 29 radiocarbon dates from the site, currently it can be stated with confidence that the site was occupied between circa AD 1050 and AD 1430 (Hart, personal communication 2019; Krus et al. 2019); however, whether it was occupied continuously or intermittently is as yet undetermined.

Three different structure types have been identified at CBHC. At least three bent-pole structures have been uncovered (Figure 1.10). These are subrectangular in plan view and are roughly 4.5 m by 5 m in dimension. They appear to be similar to Hall's (1962) gable bark summerhouse (also see Overstreet 1976). Features interpreted as hearths and storage pits are located within and immediately adjacent to the structure walls and posthole patterns suggest a single door and interior benches or sleeping platforms along the walls. Substantial pit features are located around the outside edges of the structures. Based on paleobotanical, faunal, and lithic use-wear evidence, these structures appear to have been used year-round (Edwards 2017; Sterner 2018).

In addition, portions of three longhouse-style structures have been identified (Figure 1.11), although only one is complete enough to estimate its size accurately—roughly 20 × 8 m (Moss 2010). Changes in post-mold orientation and construction technique suggest this structure was rebuilt at least once. Radiocarbon dates indicate the longhouse structures were rebuilt and reused over the course of more than 300 years. The structures are reminiscent of late Oneota and historical descriptions of longhouses in that they contain at least one burial oriented perpendicular to a side wall (Fitzgerald 1979; Knight and Melbye 1983). However, the method of construction—posts driven approximately 30 cm through the bottoms of deeply dug trenches approximately every 30 cm—is not common in later longhouses (Bluhm and Fenner 1961; McKusick 1974). Similar to the that found in the subrectangular structures, hearths and pit features are located both within and around the longhouse-style structures. However, lithic and paleobotanical data suggest that these long structures were functionally different from the subrectangular structures (Edwards 2017; Moss 2010; Sterner 2018). They appear to have been special-purpose buildings, possibly seasonally occupied. Finally, a single semisubterranean structure has yet to be identified as to function (Figure 1.12). It is relatively small, subrectangular, and roughly 2 × 2 m in area and 1 m in depth. It is stepped inward and surrounded by small post molds slanted away from the structure, suggesting the presence of a bent-pole superstructure. It is not clear if this was a storage facility, menses hut, sweat lodge, or some other type of structure. The sparseness of material culture in this structure is perplexing.

The site appears to be organized as a generally circular pattern of structures surrounding a largely empty plaza (Figure 1.8). Longhouses appear to be clustered in the north and the semisubterranean structure is in the southwest corner, with wigwams extending east and west between the longhouse and semisubterranean structures. A very large post pit was uncovered in the middle of the presumed plaza. This interpretation must be considered provisional. With only 10% of the site excavated, there is still much that can change in the interpretation of the spatial data. In addition, given the long occupational history of the site, the appearance of the structures is as likely to be due to a palimpsest effect as to a single occupational episode. Alternatively, the organizational structure we interpret may be only one episode that obscures patterns from previous episodes.

Human remains from 11 individuals have been found at the site, but no single burial program has been identified (Foley Winkler 2011; Jeske and Sterner-Miller 2014; Jeske et al. 2017). Five individuals, including the single burials of an elderly

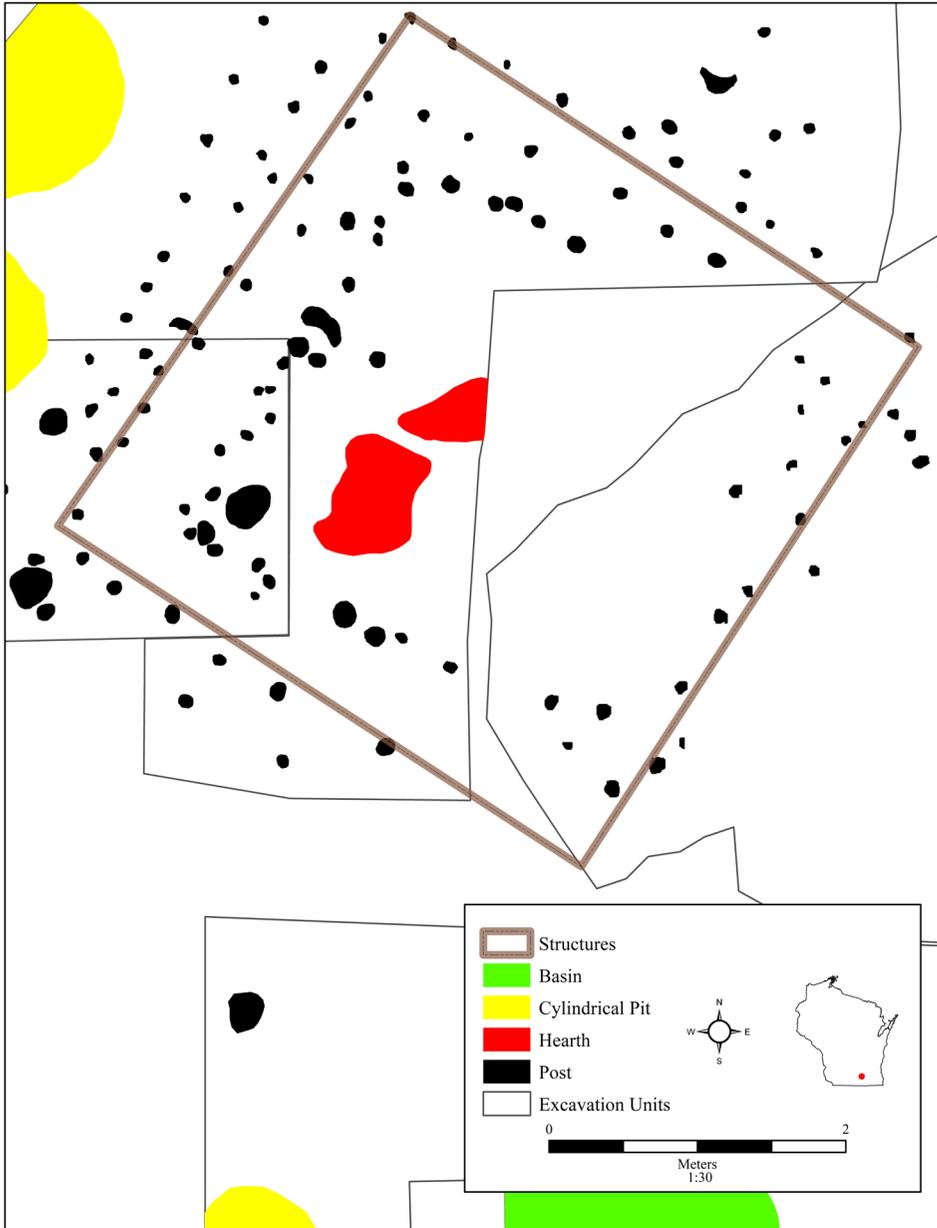
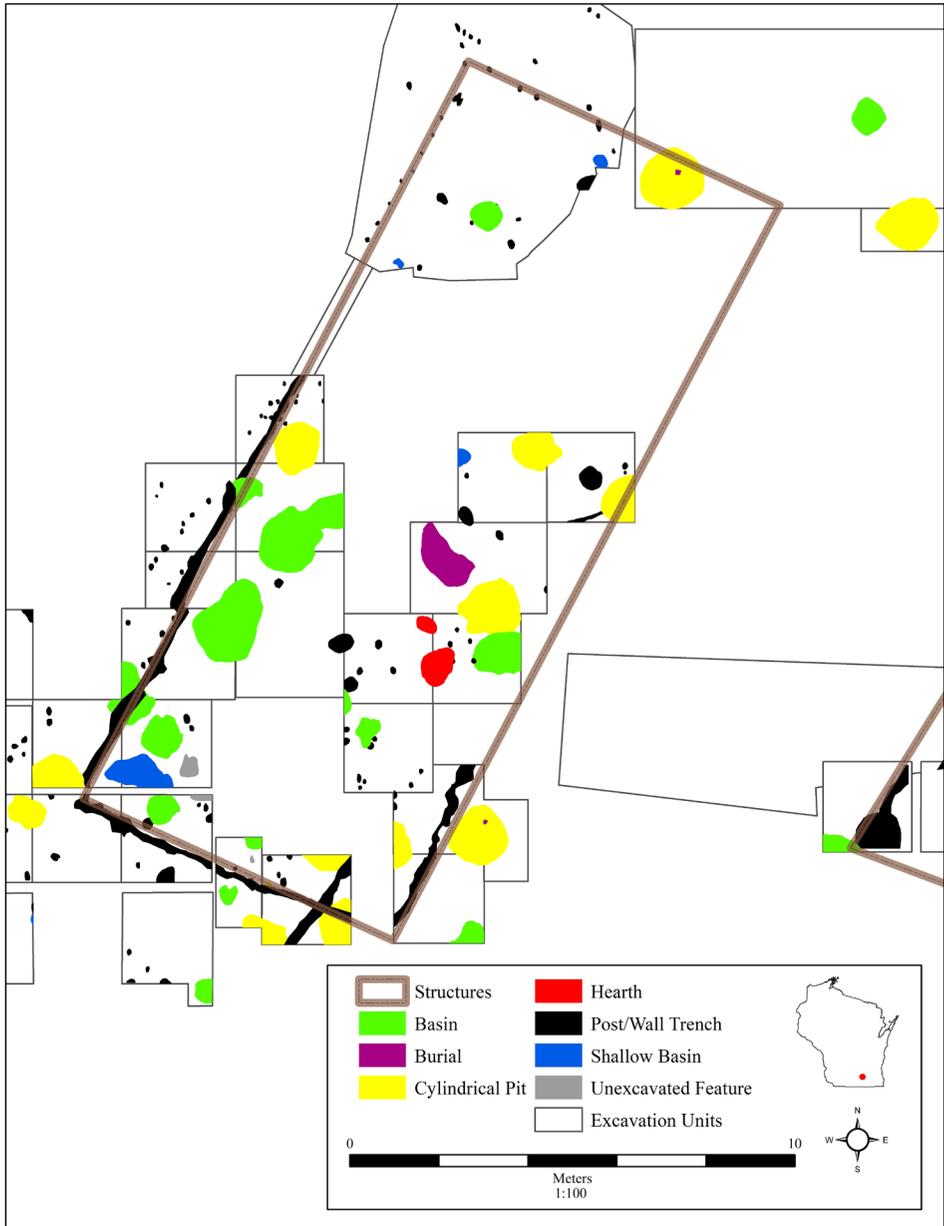


FIGURE 1.10. Double-walled bent-pole structures at Crescent Bay Hunt Club (47JE904).

woman and an adult male, plus an adult male holding two children, were buried within longhouses. Two individuals were buried outside any structures near the bluff edge. The remaining individuals are represented by isolated remains found within site refuse in nonburial features. At least 4 of the 11 individuals show evidence of trauma, and 3 show evidence for significant pathologies. Dental caries on human remains and isotopic evidence from dog bones indicate that maize was the



**FIGURE 1.11.** Longhouse structure at Crescent Bay Hunt Club (47JE904).

major component of the diet, with cultivated Eastern Agricultural Complex plants, wild plants, terrestrial animals, and a small amount of fish contributing the remainder of calories consumed by the occupants of the site (Edwards 2017; Edwards et al. 2017; Karsten et al. 2019). The dependence on maize overlaps comfortably with the dependence estimated for neighboring groups in northeastern Illinois and in the American Bottom (Emerson et al. 2005; Emerson et al. 2010; Hedman 2006).

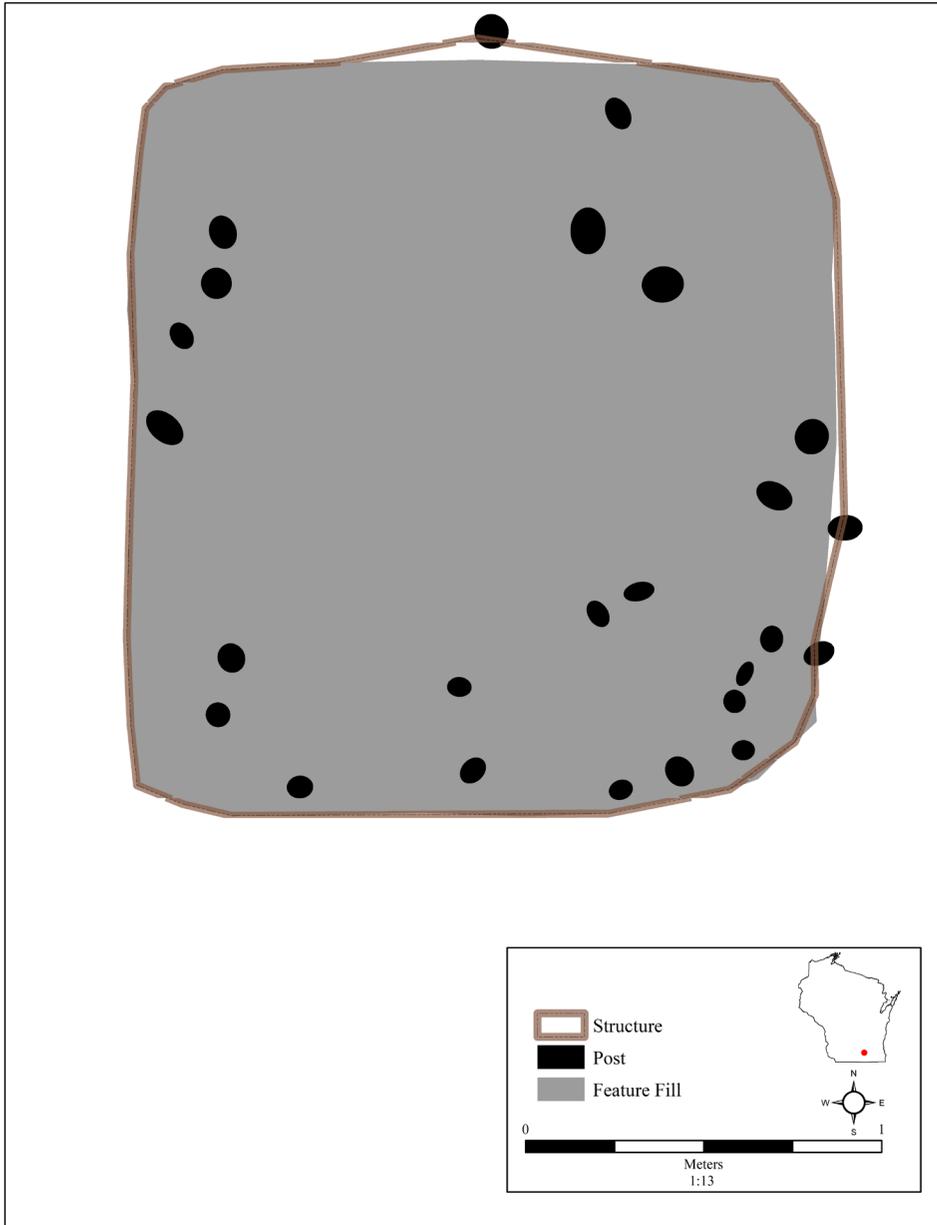


FIGURE 1.12. Semisubterranean structure at Crescent Bay Hunt Club (47JE904).

**Schmeling (47JE833)**

The Schmeling site is immediately north of CBHC; the two sites are separated by a natural draw (see Figures 1.2 and 1.9; Foley Winkler 2011; Schneider 2015). The 1 ha sized site has yielded Paleoindian through Middle Historic (ca. AD 1670–1760) materials, although it is stratified horizontally. Mr. Schmeling, an avid avocational archaeologist, collected a concentration of Clovis points at the head of the draw

on the western edge of the site (Jeske and Winkler 2008). Middle to Late Woodland (Table 1.2) materials appear to be concentrated in the south and central area, while Oneota materials are found in the central area and bluff-edge area. The historical materials recovered by Mr. Schmeling were found along the northeastern edge of the site, which was subsequently destroyed during limestone quarrying in the mid-twentieth century. All the excavated material appears to be related to the Oneota occupation of the site (Schneider 2015).

The bulk of the ceramic artifacts from Schmeling were recovered during surface survey and suggest a dense occupation in a well-defined oval at the edge of the field. Site visits with Mr. Schmeling confirmed that most artifacts were concentrated in a large dark soil stain, now plowed away. In fact, the agricultural field is so eroded and compacted that all subsurface features in the field appear to have been destroyed. However, UWM excavated 64 m<sup>2</sup> within wooded ground along the north and east edges of the site adjacent to the bluff. These excavations uncovered 11 features, including three bundle burials at the northern bluff edge (Foley Winkler 2011). It is possible that the northern portion of Schmeling was a ceremonial district—for residents of Schmeling, CBHC, or the Koshkonong Locality as a whole. The zooarchaeological remains recovered from the features yielded an atypical species composition, with an overrepresentation of raptors and aquatic mammals relative to CBHC and KCV. This pattern of faunal materials is possibly associated with ceremonial behaviors (McTavish 2019). Three radiocarbon samples from Oneota ceramic residues date from the thirteenth to the early fourteenth centuries (see Figure 1.4).

### ***Koshkonong Creek Village (47JE379)***

Like Schmeling, KCV is a multicomponent, horizontally stratified site (see Figures 1.2 and 1.9). It sits 10 m above Koshkonong Creek and is the only Oneota village in the region not immediately adjacent to Lake Koshkonong. The site was discussed by Stout and Skavlem (1908), who described two burial mounds along with “abundant indications of a small village site” (Stout and Skavlem 1908:95). The mounds were destroyed at some unknown point, but the village site was rediscovered and named the *Twin Knolls* site in a 1986 survey (Musil 1987). Survey data indicate Archaic, Woodland, and Oneota occupations. However, the Oneota

TABLE 1.2.

APPROXIMATE TIME RANGE OF ARCHAEOLOGICAL PERIODS  
IN WISCONSIN AND NORTHERN ILLINOIS.

Archaeological Typology	Time Range	
	Eastern Wisconsin/Northern Illinois	Western Wisconsin
Middle Woodland	AD 100–400	AD 100–500
Late Woodland	AD 400–1200	AD 500–1300
Oneota	AD 1050–1430	AD 1250–1650
Protohistoric	AD 1430–1634	AD 1600–1650
Historic	AD 1634–Present	AD 1650–Present

Sources: Holtz-Leith et al. 2006; Kelly 2002; Overstreet 1997; Richards and Jeske 2002; Salkin 2000; Stevenson et al. 1997; Stoltman and Christensen 2000

component is spatially separated from earlier occupations. Excavations in this area have demonstrated little evidence for mixed contexts. Just under 200 m<sup>2</sup> have been excavated, including roughly 40 pit features and approximately 175 post molds. Faunal and floral data are consistent with a year-around occupation. Five radiocarbon dates from ceramic residue and annual plants indicate that the Oneota component was occupied between AD 1050 and AD 1430 (see Table 1.1; Figure 1.4).

Three structures, of two different styles, have been identified. The first type is rectangular, measuring roughly 10 × 15 m. It appears to have been built using wall trenches like the CBHC longhouses—but only a small portion of a wall trench has been identified. However, unlike the CBHC longhouses, the KCV paleobotanical data indicate the wall represents a residential structure. The second is a double-wall pole-frame building. Only one corner has been uncovered, though it looks generally similar to the CBHC double-walled bent-pole structures. Insufficient space has been excavated to estimate village layout, though survey data suggest it may have been larger than CBHC and perhaps as large as 3 ha.

Three features contained isolated human remains that were deposited with faunal remains and other materials. The human remains represent two juveniles and one adult. The adult shows evidence of trauma and postmortem modification (Edwards and Jeske 2016; Jeske and Edwards 2014). In addition to two mounds, Stout and Skavlem (1908) indicated that human remains were exposed on the surface of the cultivated fields. There is no way to know if the human remains they described were associated with this component of the site, but it is clear that one aspect of the KCV mortuary program was disposal outside formal burial pits or mounds.

In addition to these three sites, test excavations and surveys at other regional sites indicate a multitiered settlement of the locality. Along with several other village sites (e.g., Carcajou Point, Crab Apple Point, and possibly Purnell), a series of smaller sites such as Blue Heron (Hunter 2003), Carlson (Musil 1987; Spott 2012), and Hearthstone (Jeske et al. 2015; Rodell 1987) make clear that small, perhaps seasonal or special-activity, sites exist around the lake. These sites fit within an overall model of a tightly clustered set of villages with small ephemeral hunting and collecting sites at productive nearby areas on the landscape. A larger economic landscape may be represented by the previously discussed Yahara River sites.

## Regional Chronology and the Freshwater Reservoir Effect

The question of the freshwater reservoir effect (FRE) on our interpretation of the radiocarbon chronology in the Koshkonong Locality must be addressed (see Table 1.1; Fischer and Heinemeier 2003; Geyh et al. 1998; Lovis and Hart 2015; Philippsen 2013; Roper 2013). The locality's underlying calcareous till and limestone bedrocks could theoretically cause an FRE on radiocarbon samples. This FRE would be possible if old carbon is dissolved in the waters of the Rock River and Lake Koshkonong. In addition, an FRE would require that inhabitants of the sites had prepared and consumed large amounts of old-carbon contaminated

aquatic resources. Food residues on pottery are commonly suspected as a source of FRE errors (cf. Fischer and Heinemeier 2003; Heron and Craig 2015; Roper 2013, 2014; Roper and Adair 2012). As it happens, many of our dates are samples from food residues on ceramic sherds. However, Hart and Lovis (2013) have argued that there is very little evidence, based on extant radiocarbon data sets, that FRE has affected the radiocarbon chronology from the western Great Lakes in general and have critiqued specific cases of inferred FRE (e.g., Hart and Lovis 2014). Lovis and Hart (2015) have also demonstrated, using ethnographic and experimental data, that food residues on pottery are not likely to contain fish remains (cf. Fischer and Heinemeier 2003; Roper 2013).

Current evidence indicates that fish contributed relatively little to the diet in the Koshkonong Locality. Edwards (2017, this volume) argues that stable isotope data indicate that maize contributed more than 50% of calories to the diet, while meat and fish contributed no more than 10% of calories. McTavish (2019) estimates that no more than 10%–18% of animal biomass from CBHC and KCV is fish. Although wild rice appears to have been a highly ranked plant resource at sites in the Koshkonong Locality (Edwards 2017), there is no evidence to indicate that wild rice contributes to FRE. In addition, the closest area to the Koshkonong Locality where the presence of FRE has been tested is in the American Bottom. Fort and colleagues (2018) note that FRE does not consistently affect radiocarbon dates from fish bone in their study area. Variation in fish species and in microhabitats appears to significantly influence any FRE offset. In sum, we expect carbon from fish to be insignificant in food residues on Koshkonong Locality ceramics. Moreover, even if fish was present in food residue, we have little reason to suspect that FRE would necessarily affect the date.

Empirically, a careful examination of the 47 radiocarbon dates from the Koshkonong Locality does not support an impact from an FRE (see Table 1.1). While many of the earliest dates in the region are from food residue, these dates overlap with the entire range of dates from the locality, regardless of dated material. The median date for all samples from the locality is 740 BP (Table 1.3). The median residue date is only 10 years older for all samples and is younger than both charcoal and canid bone. Interestingly, the median date from dog bone is the oldest (854 BP), even older than the median wood charcoal date. Stable isotope data indicate that there is no reason to suspect that dogs at Lake Koshkonong ate aquatic resources. Based on  $\delta^{13}\text{C}$  isotope values, the bulk of the dog diet was maize. The dog bone  $\delta^{15}\text{N}$  values indicate that Koshkonong Locality dogs consumed very little meat or fish (see Edwards 2017, this volume). Therefore, there is no reason to suspect that the dog-sample dates are affected by an FRE. If the early dates taken from dog remains are not influenced by an FRE, it is difficult to question the later dates from food-residue samples.

Finally, Bayesian analyses of the dates from the locality indicate that the early dates should not be excluded from the data set as a whole (John Hart, personal communication 2019; Krus et al. 2019). In sum, at this point, there is little reason to suspect that FRE is an important factor in the radiocarbon chronology at Lake Koshkonong. Radiocarbon hygiene protocol and testing for the presence of FRE will continue as more dates from the locality become available.

TABLE 1.3.

## MEDIAN RADIOCARBON AGES FROM KOSHKONONG LOCALITY SITES BY MATERIALS DATED.

Site	Material	<i>n</i>	Median Age BP	Median Error
CBHC	Overall	29	700	70
	Annual	10	5975	275
	Mammal Bone	2	855	22.5
	Residue	13	765	20
	Wood Charcoal	4	790	50
Schmeling	Overall (all dates from residue)	3	765	20
KCV	Overall	7	660	20
	Annual	1	520	20
	Mammal Bone	1	770	20
	Residue	5	660	20
Carcajou	Overall	5	700	70
	Annual	1	680	40
	Wood Charcoal	4	855	75
Crab Apple	Overall (all dates from wood charcoal)	1	980	55
Overall—Annual		12	5975	30
Overall—Bone		3	854	21
Overall—Residue		21	750	20
Overall—Wood Charcoal		9	800	55
Overall—All		45	740	25

## Theoretical Orientations of Oneota Research

Even with the advances of the last 20 years, the current description of Oneota is often very similar to that offered by the Hall/Overstreet paradigm (e.g., Green 2014). Variation in Oneota material culture and diet is often overlooked (Edwards 2017; Egan-Bruhy 2014). The basic horizon framework is still often used (e.g., Hamilton et al. 2010; Jackson and Emerson 2014; Richards 2010), although radiocarbon assays taken in the twenty-first century do not support the concept. An understanding of Cahokia's role in the cultural landscape of Wisconsin has become more nuanced in the last decade (e.g., Emerson 2012; Emerson et al. 2019; Emerson and Hedman 2016; Finney 2000; Slater et al. 2014; Zych 2013), but the interaction is generally viewed as having originated in the American Bottom and been unidirectional (e.g., Baltus 2014:51; Boszhardt 2012:419; Egan-Bruhy 2014; Green 2014; Pauketat et al. 2015).

We began our research with the basic idea of Cahokia as the driver of Oneota identity. However, after 30 years of data collection by numerous scholars in Illi-

nois and Wisconsin with new theoretical approaches and technological methods, this grand narrative is no longer supported (Emerson 2012; Emerson and Emerson 2017; Painter and O’Gorman 2019; Picard 2013). We believe that multiple lines of evidence, including radiocarbon, ceramic, paleobotanical, and isotopic data, suggest that Middle Mississippian and Oneota material culture manifestations resulted from an Eastern Woodlands cultural shift brought on by maize agriculture intensification, violence, and population movements circa AD 1000–1050. This shift to a maize-based agricultural economy resulted in multifaceted changes in material culture. The nature of these changes was contingent on preexisting local foodways, environmental settings, and historical relationships (Edwards 2017; Egan-Bruhy 2014; Emerson 2012; Emerson et al. 2005; Jeske 1989, 2000). People aggregated in the American Bottom circa AD 1000, with considerable in and out migration (e.g., Emerson et al. 2019; Emerson and Hedman 2016; Slater et al. 2014). People using Middle Mississippian material culture moved north for a short way along the Illinois River and farther up the Mississippi (e.g., Benden 2004; Boszhardt 2012; Delaney-Rivera 2004; Emerson et al. 2007; Fowler 1949; Pauketat et al. 2015; Stoltman et al. 2008). With the exception of the inhabitants of the isolated and relatively short-lived Aztalan site, they did not occupy regions beyond the immediate tributaries of the Mississippi or central Illinois River valleys (Bird 1997; Emerson et al. 2007; Goldstein and Richards 1991). Subsequent articles in this volume provide evidence that people living in the regions adjacent to, or part of, the Great Lakes basin appear to have been deeply enmeshed in a distinct cultural network and continued to operate on very different organizing principles than Middle Mississippians did (Berres 2001; Bird 1997; Brown and Sasso 2001; Emerson and Brown 1992; Foley Winkler 2011; Jackson 2017; Picard 2013). While people in these different networks clearly exchanged ideas and materials, the evidence suggests that these interactions were multidimensional, multifaceted, regionally situated, and not necessarily dominated by American Bottom politics (cf. Baltus 2014:51; Boszhardt 2012:419; Egan-Bruhy 2014; Green 2014; Pauketat et al. 2015). As such, our work brings our understanding of eastern Wisconsin Oneota in line with current interpretations of Upper Mississippian archaeological cultures in the Middle Mississippian world in northern Illinois (e.g., Emerson et al. 2019).

Each of the authors of the subsequent articles in this volume has been informed by the others’ research, and that research points to a multifaceted, multitiered set of cultural interactions between related, but independent, cultural groups. The Koshkonong Locality is one of a multitude of related loci, connected in some ways and isolated in others, within the larger patterns of life in the eleventh through fifteenth centuries in the Prairie Peninsula. The following articles will examine the connections and the divergences through the lithic, ceramic, mortuary, and subsistence patterns of the locality. We tackle questions of gendered labor and status, interlocality and intralocality politics, and the relationships of Koshkonong with its non-Oneota neighbors. We examine aspects of habitus and the social responses to economic stress and violence. As a result, our vision of Oneota is different from traditional models, and we hope that it begins a new discussion of humans’ adaptations to their time and place in geography and history.

## Acknowledgments

We greatly appreciate the Midwest Archaeological Conference board for choosing us as the sponsored symposium for 2018. We also thank Mark Schurr and Madeline McLeester for their help in organizing the session. Many thanks to John Hart for his close reading and critical commentary. We also wish to thank all the landowners, students, volunteers, colleagues, and institutions who have contributed time, energy, ideas, and money to our work. In particular, we thank Mr. Kevin Schmeling and the Weisensel family. Most importantly, we thank the members of the Crescent Bay Hunt Club. It has been their incredible generosity that has made it possible to carry out this project over the past two decades.

## Notes on the Contributors

### *Robert J. Jeske*

ORCID: 0000-0002-2137-0022 – Jeske is a professor of anthropology at the University of Wisconsin–Milwaukee. He cofounded Midwest Archaeological Research Services, Inc., in 1985 and earned his PhD from Northwestern University in 1987. Between 1988 and 1997, he worked at Indiana Purdue University–Fort Wayne. He has interests in stone-tool technology, mortuary analysis, ethnogenesis, and social networks in the Great Lakes and midwestern United States. He also has conducted experimental and actualistic studies of the effects of canines on the archaeological record.

### *Katherine M. Sterner*

ORCID: 0000-0002-8675-1491 – Sterner is a senior research specialist for Cultural Resource Management Services at the University of Wisconsin–Milwaukee. She received her PhD from the University of Wisconsin–Milwaukee in 2018. Her research is focused on the community organization of late prehistoric societies in the Great Lakes and Midwest. Her areas of specialization include use-wear analysis, residue analysis, spatial analysis, and ground- and chipped-stone tool technologies.

### *Richard W. Edwards*

ORCID: 0000-0001-5421-1020; @re\_1984 (Instagram); and @RickArchaeology (Facebook) – Edwards is a principal investigator at Commonwealth Heritage Group and an honorary fellow at the University of Wisconsin–Milwaukee. He earned his PhD from the University of Wisconsin–Milwaukee in 2017. Richard specializes in paleoethnobotany and GIS. His research interests include subsistence/settlement studies, landscape and environmental archaeology, risk management, ethnogenesis, and the relationship between humans and dogs.

## 2

# Upper Mississippian Stone Tools and Community Organization

Katherine M. Sterner

*CULTURAL RESOURCE MANAGEMENT, UNIVERSITY OF WISCONSIN–MILWAUKEE*

This article examines the shift from typologically complex to simpler lithic technology after circa AD 500 in the Prairie Peninsula as an approach to understanding community organization. Three types of lithic analyses were conducted on nine different Wisconsin Oneota sites to achieve research goals. Assemblage analysis was conducted on all nine materials from all sites. Microwear analysis was conducted on a subsample of four site assemblages. Finally, a small sample of lithic tools from one site was tested for protein residue. A comparison of the lithic practice of Oneota groups who settled in western Wisconsin (AD 1400–1700) to that of groups in eastern Wisconsin (AD 1050–1430) was used to develop a model of communities in two different geographic and temporal contexts. The data indicate that the Koshkonong Tradition was characterized by a tightly knit multivillage community, while evidence of such a community unit at La Crosse does not exist.

**KEYWORDS** Oneota; Lithics; Community; Microwear Analysis

## Introduction

Archaeologists have long known that stone-tool technology in the Prairie Peninsula underwent a shift from typologically complex to simpler after circa AD 500 (Bet-tarel and Smith 1973; Fitting 1975; Griffin 1983; Jeske 1992a; Kelly et al. 1984; McGimsey and Conner 1985; Mason 1981; Park 2004; Parry and Kelly 1987).

This research examines that shift as an approach to understanding community organization. By using multiple lines of evidence, researchers' analysis of stone tools can contribute to a broad understanding of how human communities are represented in the archaeological record. In this case, lithic assemblages from nine sites in Wisconsin were examined to test if these geographically isolated concentrations of villages built and maintained economic, social, and religious communities between AD 1050 and AD 1650.

By circa AD 1000, many people living throughout the western Great Lakes region had adopted a sedentary lifestyle, had settled primarily in small villages, and sustained themselves through a combination of maize agriculture and food collecting (Griffin 1960a; Hall 1962; McKern 1942; Overstreet 1997). One archaeological culture identified by this type of settlement and subsistence system, as well as by its globular shell-tempered ceramic jars, is referred to as Oneota (Gibbon 1970; Hall 1962; Overstreet 1976).

Oneota Tradition archaeological sites are found in spatially discrete areas that have been termed *localities* (Hall 1962; McKern 1945; Overstreet 1997, 2000). The way that people living at these sites related to their neighbors within the locality and structured their community identity is still unclear, although recent research has made some inroads into our understanding. Some previous analyses (e.g., Fleming 2009; Rodell 1997; Schneider 2015) have used ceramics and other artifact classes to identify levels of interaction in specific Oneota localities. In this project, the diversity of lithic practice in two Oneota localities is used to develop a model for Oneota community and to highlight temporal changes in community structure. Three types of lithic analyses were conducted on nine different Wisconsin Oneota sites to achieve these research goals: assemblage, microwear, and protein-residue analyses.

## Community and Tradition

Archaeological definitions of *community* have historically fallen into one of two categories: natural or imagined. Natural communities are bounded and develop along a relatively homogenous trajectory (Isbell 2000:245–248). The imagined community (Isbell 2000:249) is fluid, changing and populated with individuals who behave like interested agents. O’Gorman (2010:573) distinguished between the imagined and natural community approaches, saying, “Where a natural community approach might identify a village as a community and proceed from that basis to ask questions of community economics or methods of integration, an imagined community approach might first ask what relationships define community in this particular case and what dynamics led to or may have changed this configuration.” The approach taken in this project reflects both a natural and an imagined approach to community. I define *community* as a social institution reflecting shared ideals that is created and enacted through regular face-to-face human interaction. As Ruby and colleagues (2005) note, a community may consist of a single site or more than one.

Many scholars of community have noted that there is an unfortunate tendency for archaeologists to conflate community with site and community organization

with settlement patterns (e.g., Isbell 2000; Ruby et al. 2005; Yaeger and Canuto 2000). This conflation is often seen in models of Oneota settlement patterns (e.g., Hollinger 1995; Overstreet 1976; Sasso 1989). These models tend to vary depending on whether their data are from eastern or western Wisconsin. Western settlement system models are more complex, with functionally distinct site types and varied placement on the landscape based on site function (Gallagher and Stevenson 1982; Sasso 1989). Nonvillage Oneota sites in eastern Wisconsin are not well recorded and villages are usually smaller than most of those identified in western Wisconsin. Both eastern and western village sites are generally located at the intersection of multiple ecotones so that multiple environmental zones could be exploited to support a diversified subsistence system (Edwards 2010; Overstreet 1976; Rodell 1983; Sasso 1989).

Studies of Oneota community that go beyond equating site and community are rare. Berres (2001) and Schneider (2015) discuss Oneota community interaction in a way that does not explicitly define what is meant by community, but they do note that there are multiple levels on which interaction takes place. Berres (2001:187) suggests intergroup interaction was based on reciprocal feasting, while Schneider identifies marriage alliances (2015:340–346) as the basis of such interaction. Schneider uses ceramic compositional data to demonstrate that pottery vessels with inferred exotic designs were produced locally. Since women are inferred as having been the makers of pottery and the teachers of pottery making, Schneider suggests this pattern represents exogamous marriage.

Rodell (1997) examined communities in the Red Wing Locality of the Mississippi Valley, focusing on the Late Woodland to Oneota transition (ca. AD 1050–1200). He utilized Hayden's (1995:19) categories of "Reciprocator" and "Entrepreneur" communities to distinguish between Late Woodland emphasis on household production and exchange as the main avenue to wealth and power and the rise of aggrandizers, public exchanges, increased population, and profits suggested by Oneota material culture.

Fleming (2009) also developed a model for community in the Red Wing Locality using data on lithic raw materials, pottery production, mound construction, and the presence of exotic ceramics and portable art objects. Fleming used Ruby and colleague's (2005) tripartite division of residential, sustainable, and symbolic communities to describe communities at Red Wing. Assemblage differences between the sites he examined led him to identify the sites as residential communities. He identified the Mero and Bryan villages as centers of aggregation in the region and a location for maintenance of sustainable community relationships within and outside the immediate region (Fleming 2009:297).

O'Gorman (2010) used data from the Tremaine site in the La Crosse Locality of western Wisconsin to identify five kinds of community: longhouse, natal, marital, village, and regional longhouse. However, her model of community is largely based on residence in longhouses, of which Tremaine is the primary, and possibly only, example in the La Crosse Locality. Additionally, even if longhouses are the norm at Oneota sites in western Wisconsin and Iowa, extensive excavations have demonstrated that longhouses are not the norm at earlier sites in eastern Wisconsin (Jeske and Sterner 2018).

In Iowa, where Oneota manifestations may be more closely tied to historic and protohistoric Native American tribes, scholars have been better able to reconstruct Oneota social structure, kinship, and residency patterns (e.g., Benn 1995; Henning 1995, 1998; Hollinger 1993a, 1995; Staeck 1994). These features are directly connected to formation and maintenance of community identity. Hollinger (1993a, 1995) proposed a temporal shift from matrilineal to patrilineal residence patterns from late prehistory to protohistory (ca. AD 1450–1630), evidenced in the shift from multilineage longhouse residence to nuclear family wigwam residence. Radin (1923) and Staeck (1994) also find evidence for matrilineality in Winnebago oral traditions. Benn (1995) draws on these approaches, as well as other artifact evidence, to emphasize a change from a likely patrilineal/patrilineal marriage and kinship pattern during the Late Woodland to a matrilineal/matrilineal pattern seen at Oneota sites.

Each of these approaches goes beyond simply equating a site with a community. However, each author looks at different levels of interpersonal communication and cohesion. The use of a tiered system (e.g., Ruby et al. 2005; O’Gorman 2010) is nearly ubiquitous in these models. I suggest these models are more satisfying because interaction actually does occur on multiple levels. The people that we interact with at work are different from our family group; our extended family is different from our nuclear family. The ways and reasons that we interact with these different groups varies. Rather than trying to tease out these levels of interaction, the approach to community used here simply looks at communities of technological practice—that is, groups that share a common way of producing and using technology (cf. Emerson and McElrath 2001).

One identifying element of a community is Bourdieu’s (1977) concept of *habitus*. *Habitus* is defined as the routines of daily life or dispositions, as a habitual state or predisposition. In the context of community identity, *habitus* is the shared disposition of individuals who belong to a community deriving from shared daily practices. Patterns in lithic procurement, production, use, and discard are a form of *habitus* indicative of the shared dispositions of individuals who participated in these activities. Similarities in lithic practice may be used to delineate the boundaries of a community.

The viewpoint used here is that, within the discrete temporal and spatial context under study, patterns of lithic production and use are more indicative of a community sharing similar practices than they are of functional differentiation. Examination of the lithic practices at Oneota localities, consisting of villages occupied relatively contemporaneously, will determine whether there is significant intralocality variation. Significant intralocality variation suggests that village residents did not interact on a sufficiently close level to share the same practices in lithic production, use, and discard. A lack of significant intralocality variation would suggest that village residents were interacting regularly with residents of other villages. The common patterns of lithic production, use, and discard seen at subsets of Oneota sites suggest communities with broadly similar *habitus*. We expect that these practices would exhibit less diversity between individuals who are part of a community, while those outside that community will show more diversity in their practices.

## Methods and Sampling

In order to examine the relationship of lithic tools and Oneota communities, two Oneota localities were compared: La Crosse and Koshkonong (see Figure 1.1). These localities were chosen based on the number of excavated sites, an established radiocarbon chronology, and the availability of lithic data sets. Analyses were conducted on lithic assemblages from two sites in each locality and data from up to three sites from each locality for comparison. The nine lithic assemblages in this study were chosen largely because analysis of the assemblages from all the sites except Crescent Bay Hunt Club (CBHC) and Koshkonong Creek Village (KCV) had been completed prior to this research (see Anderson et al. 1995; Goatley 1995; Hollinger 1993b; Rodell 1989; Rosebrough and Broihahn 2005; Vradenburg 1994). The assemblages were analyzed using the Lurie and Jeske (1990) schema, an updated version of that schema, or a schema with comparable attributes. All tools and debitage in those analyses were included in the data set for this study. Data were collected from the CBHC and KCV sites in the Koshkonong Locality and the Tremaine and Pammel Creek sites in the La Crosse Locality. These are the most completely excavated sites in each locality to date. My data from these sites were contextualized with previously published data from the Carcajou Point and Schmeling sites in Koshkonong and the OT, Filler, and State Road Coulee in La Crosse. Radiocarbon dates at Koshkonong sites range from circa AD 1050 to AD 1430 and at La Crosse sites from circa AD 1380 to AD 1680. A total of 1,028 lithic tools and 6,596 pieces of debitage were examined from the Koshkonong Locality and 5,089 tools and 167,380 pieces of debitage were examined from the La Crosse Locality (Table 2.1).

Three methods of analysis were used to elucidate information about the functional and economic aspects of the lithic assemblages under study: assemblage analysis, microwear analysis,<sup>1</sup> and protein-residue analysis. The details of these methods have been discussed elsewhere (see Jeske and Sterner-Miller 2015; Sterner and Jeske 2017).

TABLE 2.1

LITHIC ASSEMBLAGES EXAMINED FOR THIS PROJECT.

Locality	Site Name	Site No.	Tools	Debitage	Debitage/Tool	Data Source
Koshkonong	CBHC	47JE0904	539	3,453	6.4	Sterner 2018
Koshkonong	KCV	47JE0379	425	1,916	4.5	Wilson 2016; Doyle 2012
Koshkonong	Carcajou Point	47JE0002	21	451	21.5	Rosebrough and Broihahn 2005
Koshkonong	Schmeling	47JE0833	43	776	18.0	Norton ca. 2014
La Crosse	Tremaine	47LC0095	1,709	17,121	10.0	Goatley 1995
La Crosse	OT	47LC0262	452	49,424	109.0	Hollinger 1993a
La Crosse	Filler	47LC0149	356	23,149	65.0	Vradenburg 1994
La Crosse	Pammel Creek	47LC0061	1,016	9,874	9.7	Rodell 1989
La Crosse	State Road Coulee	47LC0176	1,556	67,812	43.6	Anderson et al. 1995
Koshkonong	All Sites		1,028	6,596	6.4	
La Crosse	All Sites		5,089	167,380	32.9	

Six hundred tools were examined for microwear: 300 from CBHC, 100 from KCV, 100 from Pammel Creek, and 100 from Tremaine. A larger sample was taken from CBHC to provide a deeper understanding of tool function at one of the sites that could then be used to make inferences about the others. The microwear sample was stratified based on spatial context. All tools from feature contexts were analyzed. A sample of tools from plow-zone contexts was also analyzed to provide comprehensive representation of all spatial components of the site. All tool forms (e.g., bifaces, unifaces, flake tools, etc.) were examined indiscriminately. The 100 tool comparative samples from KCV, Tremaine, and Pammel Creek were stratified based on the proportional prevalence of basic tool forms at that site.

A 41-tool protein-residue sample was selected from the CBHC assemblage as part of a separate pilot project. All tools except one were morphofunctionally identified as triangular arrow points or unifacial end scrapers. They were all chosen from feature contexts and were selected to evaluate the efficacy of these morphofunctional labels.

## Results

The entire suite of assemblage data from CBHC and KCV was compared to stratified random samples of 100 tools from both Tremaine and Pammel Creek. Chi-square results demonstrate significant differences between the two localities (Table 2.2). The only variable tested that did not differ significantly between La Crosse and Koshkonong was the proportion of broken to complete tools.

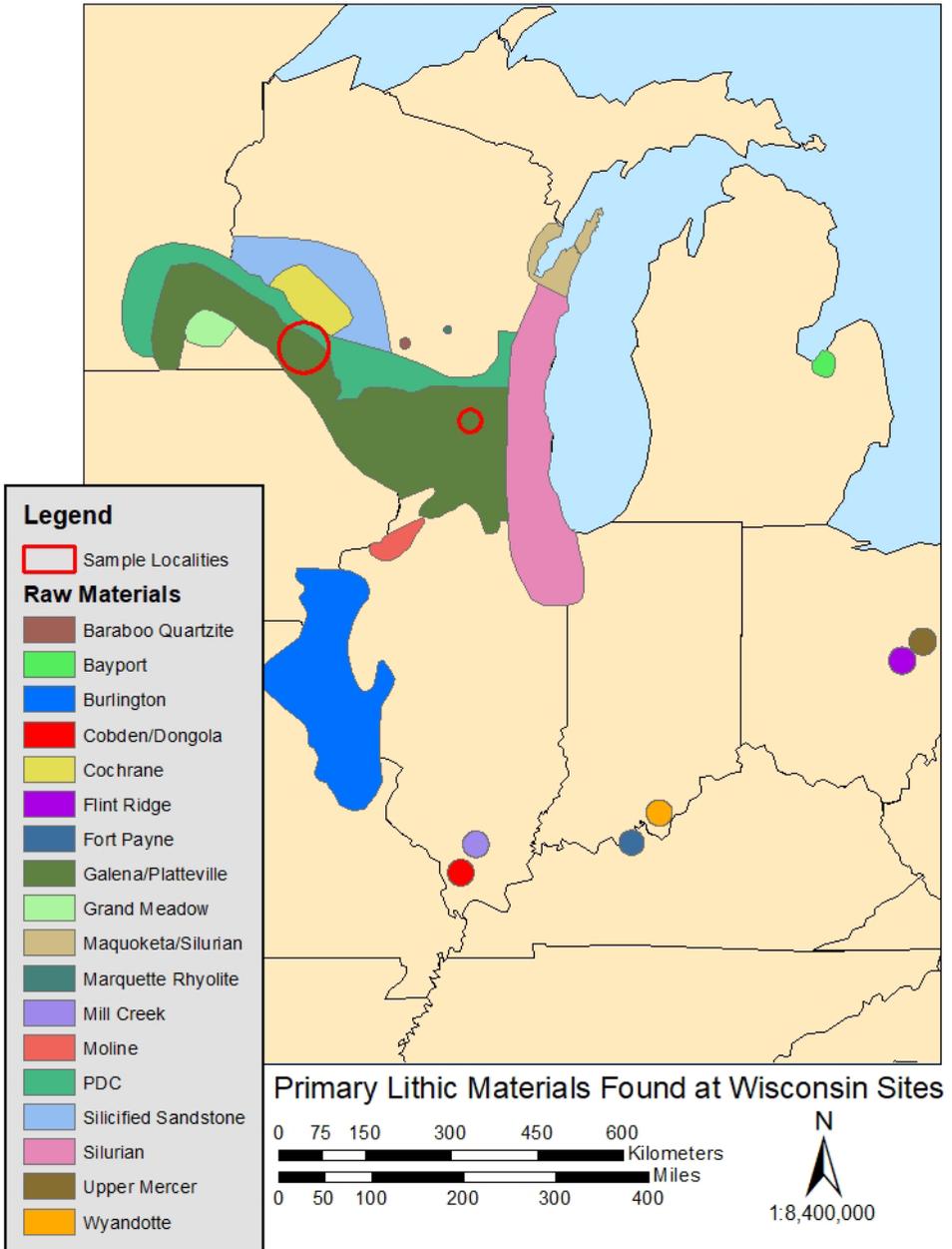
Residents of both localities were utilizing primarily local raw materials (defined as a source less than 40 km away): 83%–100% in the Koshkonong Locality and 79%–90% in the La Crosse Locality (Figure 2.1). Pammel Creek is an outlier at only 56% local raw material utilization. Since the Koshkonong and La Crosse Localities are located approximately 250 km apart, the raw materials that are considered local differ between localities. Correspondence analysis (CA) indicates that the raw material types used between the two localities are distinct (Figure 2.2). However, significant intralocality variation within the La Crosse sample is also visible on the CA plot.

CA of the morphofunctional tool types represented in the two localities also suggests more variation in La Crosse, although the results are not quite so clear-cut, probably in large part due to interanalyst variation in tool type definitions (Figure 2.3).

TABLE 2.2

CHI-SQUARE RESULTS COMPARING PRODUCTION CHARACTERISTICS BETWEEN TWO LOCALITIES.

Production Variable	df	chi-sq	p-value	Significant at 0.05?
Raw material quality	2	44.563	<0.0001	Yes
Amount of cortex	2	28.391	<0.0001	Yes
Heat treatment	1	25.172	<0.0001	Yes
Basic tool form	3	52.000	<0.0001	Yes
Method of modification	3	41.523	<0.0001	Yes
Completeness	1	1.999	0.157	No
Hafting	1	104.413	<0.0001	Yes



**FIGURE 2.1.** Primary source locations of lithic materials found at Wisconsin archaeological sites.

The average debitage to tool ratio across the four Koshkonong sites examined was 6.4, ranging from 4.5 to 21.5. The average debitage to tool ratio at La Crosse Locality sites was 32.9, ranging from 9.7 to 109.0. While this further illustrates the greater degree of variation evident in La Crosse lithic assemblages, it also demonstrates the greater emphasis on lithic economization at Koshkonong sites.

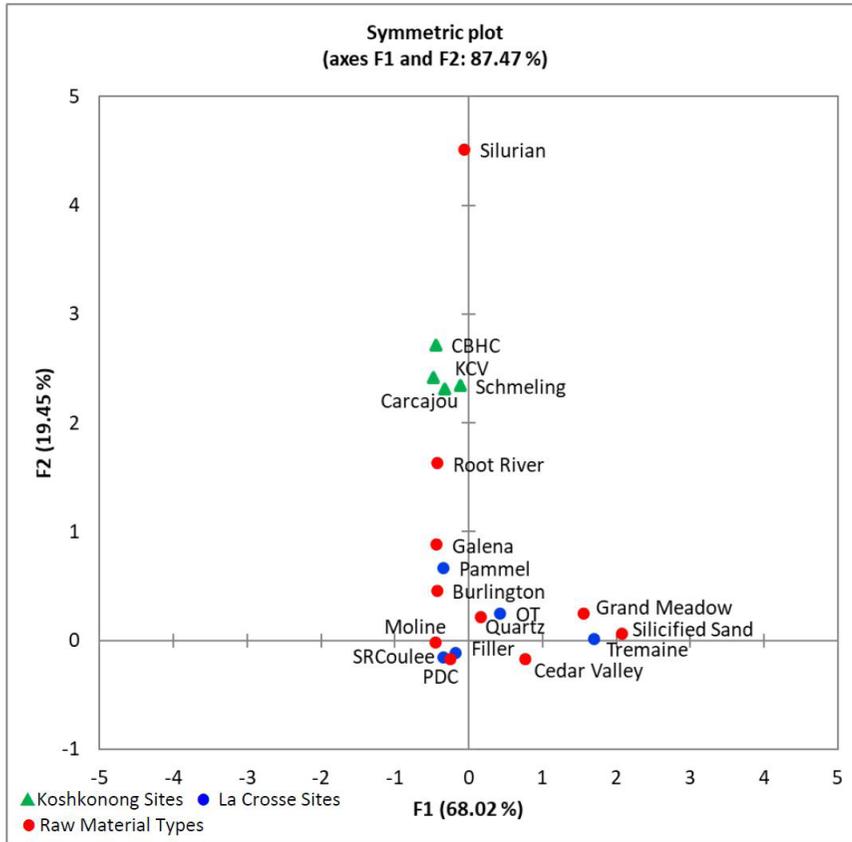
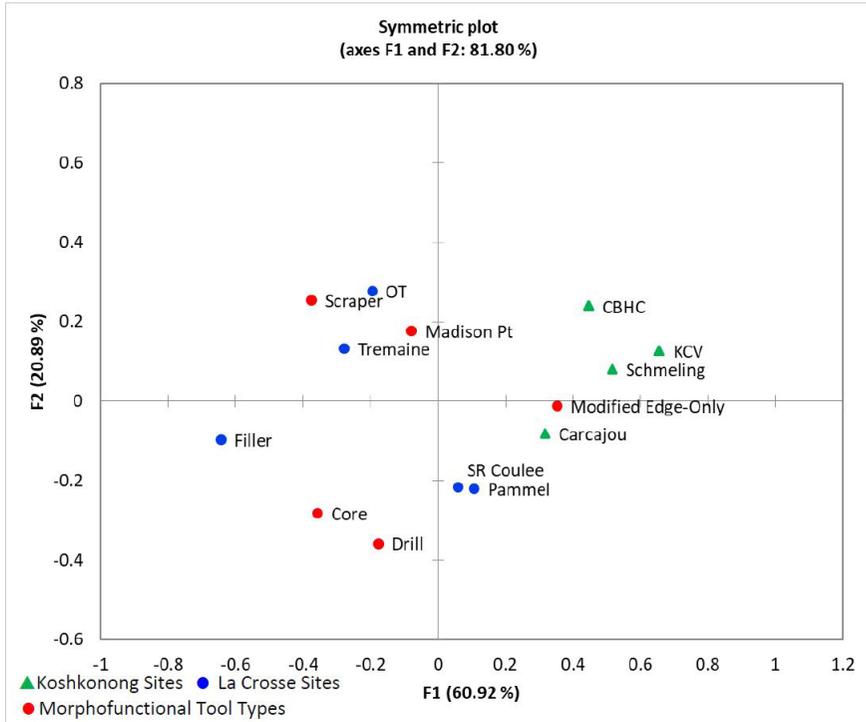


FIGURE 2.2. CA plot of raw material types from Koshkonong and La Crosse Oneota sites.

Looking more deeply at the assemblage variation provides nuance to some previously held notions about Oneota lithics. Hall (1962:121–122) noted a trend toward higher scraper/point indexes at sites farther west and later in time in the midcontinent. Following Hall, Boszhardt and McCarthy (1999) argue for a strong Plains/bison correlation for high quantities of scrapers. However, as Hall (1962:121) notes, “The relative frequency of end scrapers is highly variable among components of the Oneota Aspect.” The current study confirms Hall’s statement: the indices from the five La Crosse Locality sites vary wildly, ranging from 53 to 421 (Table 2.3). The only site with an index above 200 is Pammel Creek, which has a very different tool profile than the other sites. These data suggest that the correlations between geography, scraper production, and bison processing are not clear-cut. In Park’s (2004) analysis of the lithics from the Zimmerman site (11LS0013), he notes that tools from bison hunting were probably left at the hunting sites. McTavish (this volume) notes that the ratios of deer body parts recovered from Koshkonong Oneota sites are indicative of a hunting strategy in which butchering occurred away from the village. It follows that the lithics used for butchering at Koshkonong sites may have also been discarded



**FIGURE 2.3.** CA plot of morphofunctional tool types from Koshkonong and La Crosse Oneota sites.

away from the village. However, nonlocal butchering would result in lower numbers of flake tools or knives, not scrapers. Faunal preservation at sites in the La Crosse Locality is poor; thus, using the faunal record to support assertions that increased quantities of scrapers are correlated with increased butchering at La Crosse village sites is not an option (Styles and White 1995).

Use-wear analysis on scrapers from the Pammel Creek and Tremaine sites in the La Crosse Locality indicates interlocality variation. Almost all morphological scrapers with identifiable contact materials at Tremaine were used on meat or hide. However, over 75% of morphological scrapers at Pammel Creek were used on materials other than hide or meat (e.g., wood, plant matter, bone, or other indeterminate hard materials). Therefore, it is not safe to say that just because there were more scrapers at La Crosse sites there was more hide scraping occurring.

Use-wear analysis also indicates other differences between the localities. A CA of the contact materials manifested in the use-wear analyses of the four sites from Koshkonong and La Crosse indicates a significant difference between the localities (chi-square = 63.835;  $df = 24$ ;  $p$ -value =  $<0.0001$ ; Figure 2.4). Just as with the tool-assemblage analysis results, there appears to be more diversity in the use wear in the La Crosse assemblages than in the Koshkonong assemblages. While all four sites have diverse assemblages when it comes to the contact material types represented, the two sites from the La Crosse Locality diverge from each other more

TABLE 2.3

SCRAPER/PROJECTILE POINT RATIOS FROM SAMPLE SITES.

Site Name	Site No.	Scraper/Point Index
CBHC	47JE0904	89
KCV	47JE0379	72
Carcajou Point	47JE0002	33
Schmeling	47JE0833	29
Pammel Creek	47LC0061	421
Tremaine	47LC0095	200
OT	47LC0262	75
Filler	47LC0149	188
State Road Coulee	47LC0176	53
Koshkonong Average		56
La Crosse Average		187
Koshkonong Std. Dev.		29
La Crosse Std. Dev.		146

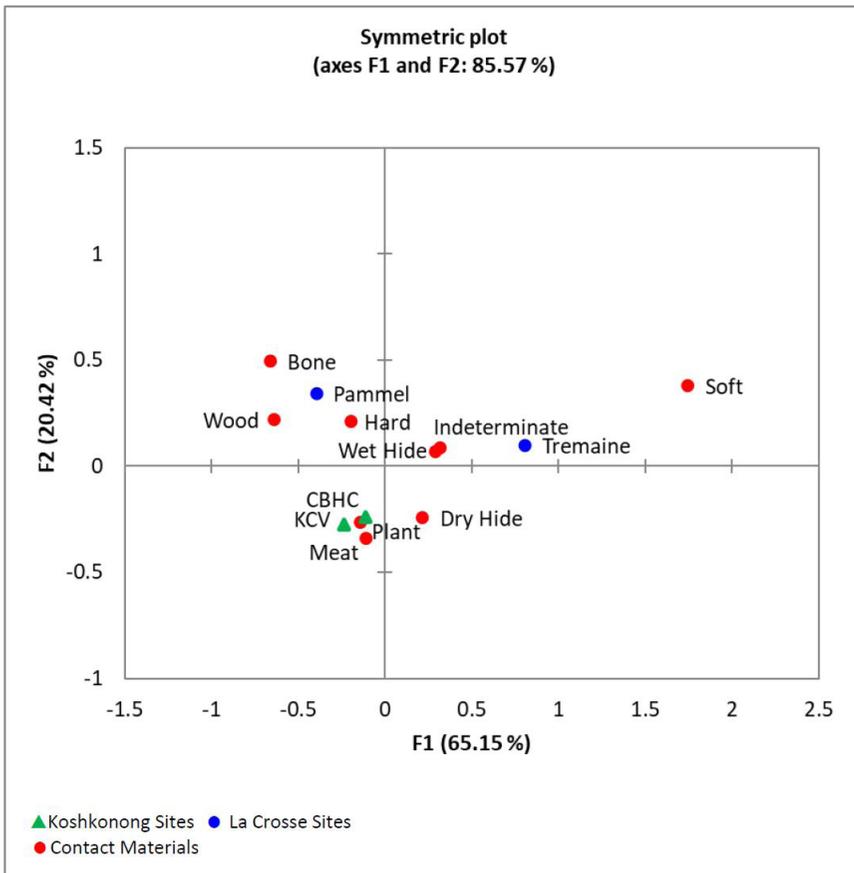
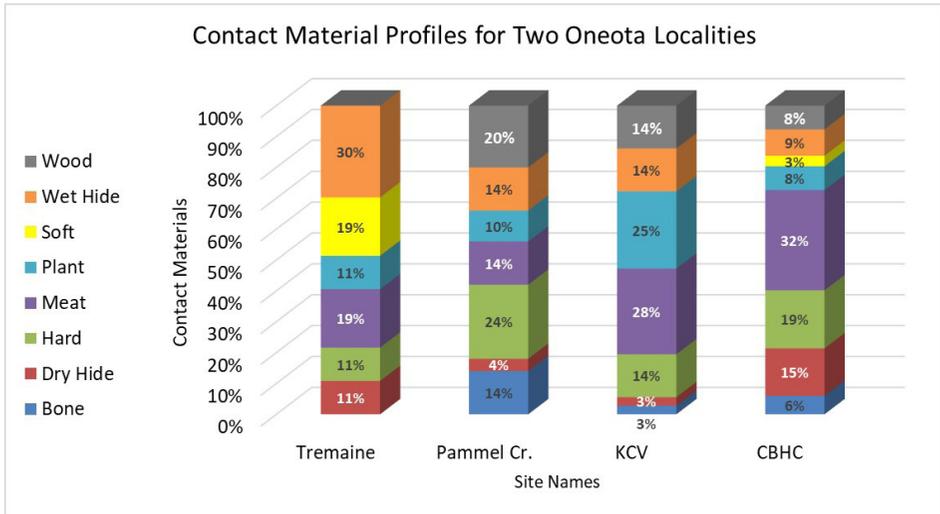


FIGURE 2.4. CA plot of contact materials from utilized tools from Koshkonong and La Crosse Oneota sites.



**FIGURE 2.5.** Contact materials from utilized tools from Koshkonong and La Crosse Oneota sites.

than the Koshkonong sites do. In fact, Pammel Creek more closely resembles KCV and CBHC than it does Tremaine (Figure 2.5).

The data from the lithic tool–assemblage analysis, debitage analysis, and use-wear analysis suggest there is as much intralocality variation at La Crosse as there is interlocality variation between La Crosse and Koshkonong. The higher proportion of generally soft materials at Tremaine is likely indicative of more meat or hide polish that was not diagnostic due to the lithic raw materials in use. If that is the case, the prevalence of meat and hide polish is much higher at Tremaine than at Pammel Creek or the Koshkonong sites. The higher prevalence of meat- and hide-wear on tools at Tremaine is probably the result of greater emphasis on meat consumption there than in the Koshkonong Locality, a conclusion based on stable isotope values (Edwards 2017:211).

While Pammel Creek’s lithic assemblage is different from both the Tremaine and the Koshkonong lithics based on the assemblage analysis, the use-wear data highlight similarities between Pammel Creek and the Koshkonong sites. However, despite similarities in the general variety of types of wear evident at Pammel Creek and Koshkonong sites, the only type of wear that displays comparable proportions across the localities is wet-hide polish. All other contact materials differ in ubiquity, not just between Pammel Creek and Koshkonong but between the two Koshkonong sites as well. Wear from meat, bone, and generally hard materials is comparably represented at KCV and CBHC, but the prevalence of all other types of wear differs by 5%–17%. The continuity displayed among Koshkonong sites in the assemblage analysis is not evident in the microwear analysis.

Three conclusions may be drawn from these results. First, macroscopic identification of lithic artifacts as tools does not mean that they will exhibit microscopic evidence allowing someone to identify specific use as a tool. Fifty-six percent of Koshkonong and 44%–58% of La Crosse artifacts identified as tools according

to the criteria in the assemblage analysis schema did not show evidence for microscopic wear patterns.

Second, microwear analysis did not identify functionality on 85 tools with morphofunctional categories from Koshkonong and 68 from La Crosse. These tools were intentionally modified by their makers, suggesting an intended function, but there is no wear to suggest what this function may have been. Or, they may have been used, retouched, and not reused, resulting in a lack of use wear. Thus, analysts cannot rely solely on microwear analysis for functional information; contextual and formal evidence must also be used to form a balanced picture of the way lithic objects were, or were not, used.

Finally, 116 lithic artifacts from Koshkonong that were modified on the edge only and 30 such from LaCrosse yielded identifiable microwear evidence for tool function. These tools, often referred to as “utilized flakes” (Goatley 1995; Rodell 1989) were used in a wide variety of cutting and scraping activities on a myriad of materials. These data supply information about an often-overlooked component of the Oneota lithic tool kit. Without researchers having an understanding of the tasks for which these expedient tools were used, a well-rounded interpretation of the role of lithics in Oneota lifeways is incomplete.

While microwear analysis is not a panacea for identifying lithic tool function, it does provide an opportunity to fill significant gaps in our knowledge. Further information on tool function can be gained using newer techniques, such as protein-residue analysis. A pilot study using protein-residue analysis documented additional details about Oneota lithic tool use at the microscale (Sterner and Jeske 2017). Forty-one lithic tools from CBHC were sent to Archaeological Investigations Northwest, Inc. (AINW) for protein-residue analysis using crossover immunoelectrophoresis (CIEP). The tests returned eight positive reactants: two bovine, one canid, three deer, and two human. The protein-residue results follow expectations for sites occupied by people using a relatively sedentary settlement system in a mixed agricultural/foraging subsistence economy (Jeske 1987:137–138). CBHC occupants produced only a few easily reworked, recyclable, and curated formal tool forms (Sterner 2018). The CIEP and microwear results show that these economically and efficiently produced artifacts are not specialized but are generic tools capable of being used for multiple tasks.

Protein-residue results also provide details into the subsistence strategies of residents beyond what can be inferred from microwear analysis. The results show a surprisingly high proportion of tools used on bison (three of eight). While sample size is a clear issue here, the presence of bison proteins on these locally made and deposited tools is surprising enough. Based on archaeozoological data, Jeske (2003a) has suggested that bison were hunted locally earlier and farther east than is commonly thought. The bison protein residue indicates that it is likely bison were being hunted locally in southeastern Wisconsin. Bison remains have been recovered at CBHC, including economically valuable and not easily transported bones (Jeske ed. 2003; Sterner-Miller 2014). The combination of protein-residue and microwear evidence indicates that the animals were probably processed at or near the site. It is important to note that all three of the tools used to process bison are indistinguishable from other tools in the assemblage in terms of raw materials used, method of

manufacture, or depositional context. It is the blood-protein residues that provide the indicator that the tools were used on bison.

One tool yielding dog-protein residue was recovered from a feature less than 10 m from two ritual dog deposits. The dog skeletal evidence indicates that these dogs were not butchered for food. Despite the fact that this tool does not stand out from the general pattern of tools at the site, there is evidence that it was used for the ritual butchering of dogs. The lithic raw material it is made from is local, and there is nothing in the manner of production, tool morphology, or depositional context of the tool to indicate its special status as a tool used for ritual purposes.

Human-protein residues on projectile points provide additional support for recent inferences about Oneota violence (Jeske 2014; Karsten 2015). The sample of two projectile points with human blood on them is not conclusive evidence of interpersonal violence, but coupled with the osteological and other archaeological evidence, the sample does suggest that violence was a significant part of Oneota life in eastern Wisconsin.

Using a combination of residue and microwear evidence not only affords the most complete picture of tool function but it also offers an opportunity to cross-check the information about use provided by each method. In some cases, residue analysis provides information about tool use, whereas microwear analysis offers none. In other cases, microwear and residue analyses present conflicting use signatures, indicating multiple functions or incidental contact with blood. Without the complement of microwear analyses, the protein residues on artifacts are largely devoid of direct contextual information about use and may be interpreted in a variety of ways. Without the complement of residue analysis, even high-power microscopy provides little information on the actual resource processed by the tool user.

## Discussion

Assemblage, microwear, and residue data were used to construct models of Oneota communities in the two localities under study. Correspondence analysis indicated very little diversity in the raw materials used or morphofunctional tool types produced at sites in the Koshkonong Locality. There was also only minimal diversity in the activities for which tools were used at Koshkonong sites. The four sites examined in this study are located less than 3 km from each other. There are additional Oneota sites within that 3 km radius and still others listed in the Wisconsin ASI files that may be related to Oneota occupation around the lake. The radiocarbon dates from Koshkonong Locality sites indicate that they were occupied by related groups contemporaneously—or cyclically over very short periods of time. The lack of inter-site diversity in lithic data suggests that residents of these villages shared a similar habitus. Ceramic data also suggest as much (see Carpiaux 2017, 2018; Schneider 2015).

The material culture data from Koshkonong sites indicate that the people living at the four villages examined in this study were all members of one community, as *community* is defined in this study. The similarity in lithic production, use, and discard exhibited at Koshkonong Locality sites suggests that occupants of these

villages shared similar daily experiences. Although the radiocarbon evidence does not demonstrate conclusively that all four villages were occupied at the same time for their entire occupations, there is certainly a period of overlap between circa AD 1250 and AD 1350, when all were occupied. As Isbell (2000) notes, communities are fluid and changing, and it is likely that people moved about the landscape at Lake Koshkonong in different ways at different times. Nonetheless, it appears that individuals were connected through a tightly knit multivillage community along the northwest shore of the lake for at least 300–400 years (see also Carpiaux 2018).

The situation in the La Crosse Locality is more complex than that in Koshkonong. There is more diversity in the settlement patterns and chronology as well as in lithic utilization. Sasso (1989) proposed a settlement model for Oneota in western Wisconsin based on systematic survey of the Coon Creek drainage near La Crosse. Sasso's model is more detailed in that he accounts for seven functionally different types of sites—Major Habitation sites (villages), Minor Habitation sites (hamlets), Minor Habitation sites (rockshelters), Ephemeral/Extractive sites, Defensive sites, Mortuary sites, and Agricultural sites—and examines their placement on the landscape. Based on the distribution of site types, Sasso argues that in the La Crosse region there is a dichotomy of Oneota subsistence practices, leading site residents to exploit aggregated and dispersed resources seasonally (1989:254–255). This settlement system is far more diverse than in the Koshkonong Locality, where very few nonvillage sites have been identified (Edwards 2010).

Most of the five La Crosse Locality sites included in this study have radiocarbon dates ranging between circa AD 1400 and AD 1650. However, Tremaine has produced some dates as early as AD 1250, and the dates for Pammel Creek indicate an occupation circa AD 1380–1570. The vast majority of dates at La Crosse sites come from wood charcoal, which can often return early dates (see discussion in Shott 1992). At all five sites, the most intense occupation appears to have occurred between circa AD 1400 and AD 1550.

Although all five sites are interpreted as villages, evidence of structures has only been found at the Tremaine site. Additionally, the OT site—and possibly the Filler site—was likely part of the Tremaine village. The sites in La Crosse are also spaced farther from one another than are sites at Koshkonong (Figures 2.6 and 2.7). With the exception of Tremaine, OT, and Filler, which are immediately adjacent to one another, La Crosse village sites range from 2 km apart to 16 km apart.

It is not surprising, given the degree of spatiotemporal variation in the La Crosse Locality, that there is corresponding variability in lithic habitus. What is surprising is the degree of that variation. All the La Crosse Locality sites are more different from Koshkonong sites than they are from each other in terms of lithic utilization. A series of chi-square tests examining differences in lithic tool production characteristics between Tremaine and Pammel Creek indicate that there is a significant difference between the two La Crosse Locality sites (Table 2.4). No such differences exist between Koshkonong sites.

The most surprising observation is that three sites in the Tremaine Complex exhibit almost as much variation among themselves as they do in comparison to the other two sites from the locality. O'Gorman (1995) interprets the Tremaine occupation as earlier than Filler and OT as a functionally distinct portion of the

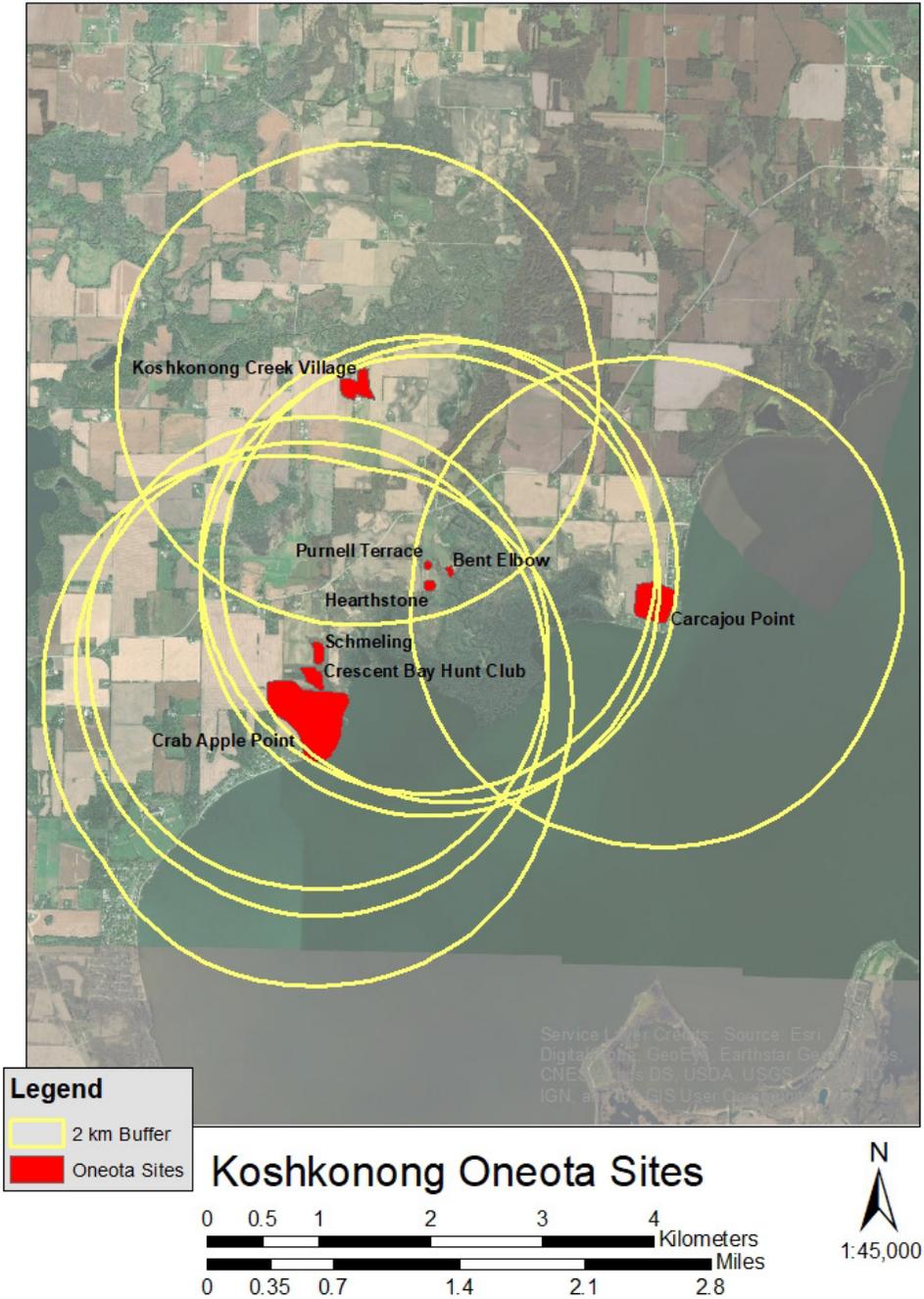


FIGURE 2.6. Map of 2 km buffers around Koshkonong Oneota sites.

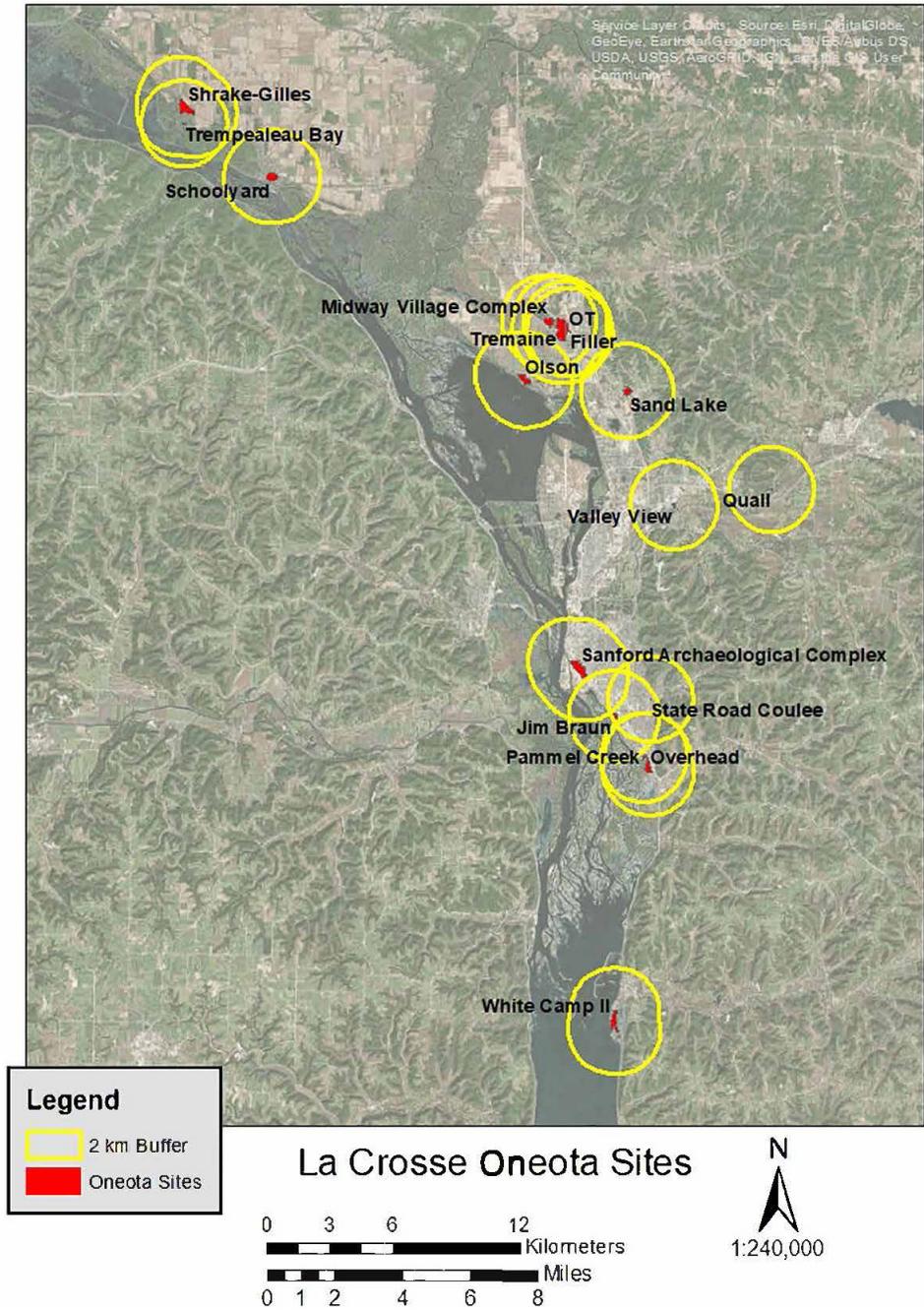


FIGURE 2.7. Map of 2 km buffers around La Crosse Oneota village sites.

Table 2.4

## CHI-SQUARE RESULTS COMPARING PRODUCTION CHARACTERISTICS BETWEEN PAMMEL CREEK AND TREMAINE SITES.

Production Variable	df	chi-sq	p-value	Significant at 0.05?
Raw material quality	2	44.058	<0.0001	Yes
Amount of cortex	2	18.536	<0.0001	Yes
Heat treatment	1	12.305	0.0005	Yes
Basic tool form	2	8.231	0.0163	Yes
Method of modification	3	31.647	<0.0001	Yes
Completeness	1	14.991	0.0001	Yes
Hafting	1	46.162	<0.0001	Yes

relatively contemporary Tremaine village. The radiocarbon sequence from the Tremaine Complex indicates that Filler and OT were primarily occupied between circa AD 1450 and AD 1650, while Tremaine shows evidence of an earlier occupation beginning circa AD 1250. Portions of all seven longhouses at Tremaine were constructed prior to AD 1400, suggesting that Tremaine represents the original Oneota Tradition village settlement in the area. Filler and OT elements appear to be later occupations. Lithic data support this interpretation, given the much higher proportion of silicified sandstone, a material considered indicative of earlier sites (Goatley 1995:155), at Tremaine, with higher proportions of Prairie du Chien cherts at Filler and OT.

The other two La Crosse sites included in this analysis are located approximately 16 km south of the Tremaine Complex. The State Road Coulee and Pammel Creek sites are only 2 km from each other, but radiocarbon and ceramic evidence suggest that State Road Coulee postdates Pammel Creek. The lithics from the two sites are more similar to each other than they are to those of the Tremaine Complex. Both State Road Coulee and Pammel Creek exhibit atypically high proportions of Burlington chert (11% and 21%, respectively). The basic tool forms and morphofunctional tool types identified at State Road Coulee and Pammel Creek are also comparable. Use-wear data are not available for State Road Coulee, but comparison of the Pammel Creek use-wear data with that from Tremaine and the two Koshkonong sites indicates that the activities being undertaken at Pammel Creek differed from the typical pattern of butchering and hide processing seen at Tremaine and the two Koshkonong sites.

The lack of contemporaneity and the differences in lithic habitus indicate that the construction of community in La Crosse differed from that at Koshkonong. Moreover, the variation in lithic habitus among sites within the La Crosse Locality suggests that there may have been multiple communities—either through time or contemporaneously—within the region. State Road Coulee and Pammel Creek are geographically more distant within the locality and differ from Tremaine, Filler, and OT in ways—raw material type and quality, basic tool forms represented, and manufacturing sequence—that Koshkonong sites do not. OT and Filler differ from Tremaine in a way that suggests chronological variation. It appears that a close-knit, contemporaneous multivillage community of the type constructed in Koshkonong did not exist in La Crosse. Whether or not community in La Crosse

consisted purely of single villages or of some other unit of organization requires the examination of more data from more fully excavated sites within the locality.

## Conclusions

The research results indicate very different community formations between the two study locations, evidenced by greater diversity in raw material type and quality, basic tool forms, and tool functions among the La Crosse Locality sites than among the Koshkonong sites. The La Crosse village sites also exhibited more temporal variation and were spaced farther apart, with smaller nonvillage sites located in the intermediate space between them. These factors suggest that the Koshkonong Oneota Tradition is characterized by a tightly knit multivillage community, while evidence of such a community unit at La Crosse does not exist. Analysis of inter-site lithic habitus at the La Crosse Locality is complicated by temporal variation. It is possible that the heterogeneity between sites reflects change over time. Settlements are more widely spaced on the landscape, introducing additional factors of travel distance that might have affected the construction or maintenance of a community. Data from more sites in the La Crosse Locality are needed before conclusions can be drawn about the nature of community there (see Painter and O’Gorman 2019).

Differences in community construction between the two localities are related to variation in village size and population density, prevalence of violence, and social differentiation. In terms of population density, the difference between the two localities is stark (see Jeske, this volume). A single longhouse at Tremaine may have housed more people than lived in the entire village at Crescent Bay (see Table 2.4). In La Crosse, the higher concentration of people in single large villages, as opposed to dispersed small villages, led to a much higher population density in areas of the La Crosse Locality. The space between villages was greater, providing a buffer zone between areas of high population. The population nucleation in La Crosse also appears to be correlated with evidence of social differentiation not present at Koshkonong villages.

A comparison of the Koshkonong and La Crosse burial practices indicates that La Crosse social structures may have been more formally ceremonial than those in Koshkonong. In eastern Wisconsin, Foley Winkler (2011:199) finds “virtually no evidence for ranked or hierarchical burial treatment.” In fact, she notes more variation within Oneota and Langford manifestations than between the two. At Tremaine, burials are located either under longhouse floors or on the central knoll at OT, although some miscellaneous skeletal elements were also recovered from five nonmortuary features and another disturbed provenience at OT. O’Gorman (1995) notes evidence for social differentiation in the knoll burials at the OT site, which are contemporaneous with the lowland burials in longhouses at Tremaine. The abundance of grave goods in one of these knoll burials is also suggestive of differential social ranking (O’Gorman 1995:242).

Evidence from mortuary practices in both the La Crosse and Koshkonong Localities indicates that structurally organized status differentiation at Oneota sites was significantly less visible than it was among Middle Mississippians. Evidence

from oral tradition in ethnographic and ethnohistorically known groups of the region also shows little structural hierarchy. Nonetheless, a comparison of the Koshkonong and La Crosse burial practices indicates that La Crosse social structures may have been more formally ceremonial than those for the Koshkonong (e.g., Benn and Thompson 2014; Rodell 1997). Unlike in earlier time periods, there is no evidence for ethnic or social differentiation based on lithic tool forms.

It appears that conflict, and the accompanying risk-management strategies (see Edwards, this volume) employed by Oneota Tradition villagers, was more prevalent in Koshkonong than in La Crosse. Koshkonong groups used more intensive lithic economizing strategies, including a tightly circumscribed raw-material acquisition. While both groups utilized local raw material sources, Koshkonong sources were mostly within 1 km or 2 km of the sites, while La Crosse sources were spread throughout the 40 km of the local range. Intergroup violence has been well documented at Oneota sites, most famously by Milner and colleagues (1991a) and later by Hatch (2015), Hollinger (2005), Oemig and Karsten (2016), and others. The group with whom Koshkonong Locality residents were in conflict has yet to be determined (see Jeske, this volume). Given their distance from other localities, it is likely that conflict at Koshkonong was between people from Langford or other Oneota localities. Given the degree of interconnectedness between the Koshkonong villages (Edwards 2017), it is unlikely that intragroup violence between these villages was a concern.

Broad similarities between the La Crosse and Koshkonong Localities exist because of their mutual adherence to Oneota traditions. Some of these traditions endured shifts in subsistence systems, settlement practices, political organization, and geographic location. Examination of lithic utilization at villages from both early and late manifestations of the Oneota Tradition indicates only four broad generalizations that apply to all Oneota lithic assemblages: local raw material acquisition, use of expedient tool technology, economization in production, and emphasis on purely utilitarian tools. Most of these characteristics are not unique when examined in light of contemporaneous traditions (e.g., Billeck 1991; Cook and Comstock 2014; Ensor 2009; Jeske 1987, 1992a, 2000, 2002; Nass 1987; Redmond and McCullough 2000; Robertson 1984; Salkin 2000; Vander Heiden and Richards 2015; Wilson 2016). For years, scholars have noted the ubiquity of these characteristics of lithic practice during the Late Woodland and Late Prehistoric periods in the Eastern Woodlands. The lack of lithic criteria differentiating one archaeological tradition from another during this time period has led to a dearth of literature on lithic practice during late prehistory. There has been an implicit assumption that lithic tools have little to tell us because researchers cannot differentiate them between the contemporaneous archaeological traditions in which they are found. The comprehensive analyses presented here demonstrate that lithics cannot, in fact, be used to distinguish between multiple late prehistoric traditions. There is as much variation in lithic practice within traditions as across them. However, detailed examination of this variation within traditions provides valuable information on community structure, risk-management strategies, social status, settlement patterns, and the daily lived experience of the people who made and used lithic objects. Far from being irrelevant, late prehistoric lithic analysis allows us to identify

more meaningful units of analysis than that of the Oneota Tradition, where real differences in people's daily practices and experiences can be identified.

## Endnote

1. Tools sampled for this analysis were examined using an Olympus BH-1 compound microscope with reflected light fluorescence attachment. Prior to examination, tools were washed for 20 minutes in an ultrasonic cleaner, using warm water and dish detergent (Ahlrichs and Sterner-Miller 2015; Juel Jensen 1994; Pope 2005). Tools were scanned at 50x, 100x, and 200x magnification and use wear was documented with photomicrographs taken with an Amscope 5.1MP digital camera. Designations of use were made based on microflaking, rounding, and micropolishes. Archaeological specimens were compared with the UWM ARL experimental use-wear collection to arrive at the most accurate designation of use possible (Sterner-Miller et al. 2015).

## Acknowledgments

The author would like to thank Bob Jeske, Jean Hudson, John Richards, Pat Richards, and Jeff Behm for their comments on the dissertation from which this article resulted. Thanks also go to John Fagan and Cam Walker (Archaeological Investigations Northwest, Inc.) for their work on the blood-residue analysis. Rick Edwards and Bob Jeske also deserve acknowledgment for their assistance in organizing and editing this article in particular and this volume in general. Finally, many thanks to John Hart for his insightful comments on an earlier draft of this article. Any errors or omissions are the sole responsibility of the author.

## Note on Contributor

### *Katherine M. Sterner*

ORCID: 0000-0002-8675-1491 — Sterner is a senior research specialist for Cultural Resource Management Services at the University of Wisconsin–Milwaukee. She received her PhD from the University of Wisconsin–Milwaukee in 2018. Her research is focused on the community organization of late prehistoric societies in the Great Lakes and Midwest. Her areas of specialization include use-wear analysis, residue analysis, spatial analysis, and ground- and chipped-stone tool technologies.

### 3

## Identities in Clay: Displays of Group Identity on Pottery from Oneota Villages on Lake Koshkonong

Seth A. Schneider and Natalie A. Carpiaux

*CULTURAL RESOURCE MANAGEMENT, UNIVERSITY OF WISCONSIN–MILWAUKEE*

Recent research has examined the relationship between Oneota localities in eastern Wisconsin, defining multiple and overlapping identities among eastern Oneota groups in Wisconsin. The ceramics reflect a complicated sociopolitical relationship between localities and between their inhabitants. Between AD 1050 and AD 1430, potters chose specific manufacturing techniques and decorative motifs to emphasize and communicate different aspects of their identities. In the Koshkonong Locality, the use of shell temper, vessel shape, and decorative motifs connects them to a larger network of Oneota groups distinct from Middle Mississippian and Late Woodland networks. However, potters used grooved-paddle surface treatments and unique designs to emphasize their sociopolitical autonomy from neighboring Oneota localities and Upper Mississippian groups in the Prairie Peninsula.

**KEYWORDS** Oneota Pottery; Ceramic Petrography; Energy Dispersive X-ray Fluorescence; Group Identity

### Introduction

Oneota has traditionally been known as a “pottery culture,” with assemblages dominated by shell-tempered globular jars identified over a wide geographic region

(Hall 1962; Hollinger and Benn 1998; Keyes 1927). The concept of Oneota is often treated as a unitary phenomenon—but variation between regions due to multiple variables such as individual and kin identities, cultural traditions, environmental constraints, and idiosyncratic human agency should be expected.

In Wisconsin, Oneota material culture tends to cluster within certain distinct geographical locations, termed *localities* (see Figure 1.1; Overstreet 1978, 2000; Schneider 2015). Temporal horizons and phases have been proposed for all Oneota manifestations in Wisconsin. These horizons are typically based on changes in vessel morphological attributes and decorative elements and motifs on pottery (Boszhardt 1994; Hall 1962; Overstreet 1995, 1997), as well as shifts in house structures (Hollinger 1995) and in subsistence (Gibbon 1986). For example, Boszhardt (1994) has argued that in western Wisconsin there is a strong temporal difference in Oneota pottery types in the La Crosse region, which has been reduced to three phases: Brice Prairie (AD 1300–1400), Pammel Creek (AD 1400–1500), and Valley View (AD 1500–1625). However, ceramic and other data from eastern Wisconsin indicate that the phase and horizon frameworks cloak significant chronological overlap, as well as intra-site and inter-site variation, thus providing little analytical utility (Carpiaux 2018; Jeske 2008; Jeske et al., this volume; Moss 2010).

In this study, we examine the nature and extent of economic interaction and social boundaries between three geographically separated localities in eastern Wisconsin during the period of AD 1050–1430: Koshkonong, Grand River, and Waupaca (see Figure 1.1). The goal of this analysis is to understand the level of intergroup social, political, and symbolic relationships and the formation of identity as reflected in ceramic technology in eastern Wisconsin during the eleventh through fifteenth centuries. We begin by examining intralocality patterns in the Koshkonong Locality and then expand to a multilocality comparison that includes a total of seven sites from the three localities.

## Locality Backgrounds

Oneota localities are physically separated across east and east-central Wisconsin (see Figure 1.1). Sites containing Oneota ceramics are generally situated along riverine and eutrophic lake environments (Gibbon 1969a; Overstreet 1976; Rodell 1983). The background of the Koshkonong Locality has previously been discussed (Jeske et al., this volume), so only brief descriptions of the Grand River and Waupaca Localities are provided here.

### *Grand River Locality*

Two Oneota sites are associated with the Grand River Locality: Walker-Hooper (47GL65) and Bornick (47MQ65; Gibbon 1969a, 1971, 1972a; Jeske 1927). Walker-Hooper is a village site located on the Grand River, east of the Grand River Marsh in Green Lake County. The Bornick site is a village approximately 18 km to the northeast and near the eastern shore of White Lake in Marquette County, Wisconsin (see Figure 1.1). Radiocarbon assays indicate occupation of the Walk-

er-Hooper village site occurred between AD 1200 and AD 1400 (Gibbon 1971, 1972a; Schneider 2015).

### ***Waupaca Locality***

Three Oneota sites have been identified in the Waupaca Locality: Burley Brew (47PT159), Blinded by the Light (BBLT; 47PT191), and Dambrowski (47PT160; Kuehn 2007; Riggs et al. 2009). The sites are approximately 1.6 km apart from each other along the Tomorrow River and Waupaca River in Portage County. Only the pottery assemblages from the Blinded by the Light and Dambrowski sites are used in the following analyses. Calibrated radiocarbon assays from wood charcoal indicate the Dambrowski and Blinded by the Light sites were occupied from AD 1100 to AD 1400.

### **Localities: Isolated or Integrated?**

Archaeological survey data suggest that large portions of vacant landscape separated Oneota localities in the western Great Lakes and Midwest after circa AD 1000. Between circa AD 400 and AD 1000, a decline in nonlocal materials and an increase in local pottery styles suggest diminished contact and an increase in the distinction between these geographically separated groups (Milner 2007:195). This population nucleation (McKern 1945), the apparent buffer zones between localities (Emerson 1999), and antemortem skeletal trauma (Kerber 1986; Milner et al. 1991b) are evidence for increasing intergroup violence. Small or undefended work parties entering buffer zones to forage and/or hunt may have made easy targets for enemy raiders (Anderson 1994; Depratter 1991; Hickerson 1965). The risk of violence may have encouraged people to remain close to defensible villages (Milner 2007).

This violent pattern has been previously demonstrated in several Oneota localities. For example, in the central Illinois River valley, it appears that thirteenth-through fifteenth-century populations were engaged in regular low-level conflict (Milner 1992; Milner et al. 1991a; Milner and Smith 1990). A similar pattern of violent trauma is evident on the western shores of Lake Winnebago, where recent examination of skeletal remains from Oneota sites has demonstrated that 1 in 3 individuals died from violence (Karsten 2015). Northeastern Illinois sites from this time period also indicate relatively high levels of violence (Emerson et al. 2010; Foley Winkler 2011; Jeske 1989, 2000, 2003b; Strezewski 2006). Similar levels of violence appear to be the case at the Koshkonong Locality based on multiple lines of evidence, including skeletal trauma, resource use, and defensive positioning of settlements (Edwards 2017, this volume; Jeske 2014, this volume; Jeske and Sterner-Miller 2014). Additional research is necessary to determine if similar patterns are manifest in the Grand River and Waupaca Localities.

If the inference that the vacant areas surrounding Oneota localities were buffer zones or “no man’s lands” (Emerson 1999; Milner et al. 1991a), then we expect that the physical transportation of pottery between localities would become restricted. As individuals’ interactions became restricted, ideas concerning pottery

production and design would become regionalized. Eventually, the limited interaction between localities could encourage the development and maintenance of distinct identities, reflected in ceramic vessel morphology, construction techniques, paste recipes, and decorative techniques.

## Research Questions

To address the goal of our article, we ask four questions:

1. Do Oneota pottery types at KCV vary chronologically in a distinct and systematic way?
2. Do ceramic styles and manufacturing practices from sites in the three localities vary in a way that indicates potters in eastern Wisconsin Oneota localities were largely isolated from one another?
3. If not, do the pottery assemblages from the sites in the three separate areas indicate (a) exchange of goods, (b) movement of members into groups, (c) some other type of exchange, or (d) independent agency?
4. If they do vary, does the seemingly isolated nature between Oneota sites in the three localities indicate social and political boundaries that create distinct identities or ethnicities (cf. Emerson 1999:38; Gibbon 1972b:175; Jeske 1990, 1992b; Richards and Jeske 2002:47)?

Clay is malleable and allows the potter to change the appearance of vessels by altering the shape, surface texture, and other attributes that are the basis for defining decorative style (Rice 2015:388). Shell-tempered globular jars have been used to define Oneota over a broad geographic area in the western Great Lakes and plains and have been taken by some to indicate an ethnic identity (e.g., Sackett 1977). However, there is a large amount of variation in morphology and decoration among vessels that seems to be connected to both time and geography. For many decades, archaeologists have used different combinations of paste recipes, vessel form, and decorative styles to define multiple types of Oneota wares (e.g., Hall 1962; McKern 1945; Mason 1966; Overstreet 1976; Schneider 2015; Schneider and Richards 2011). Thus, while broadly similar, an Oneota vessel in western Wisconsin may look distinctly different in form and decorative motif from an Oneota vessel found in eastern Wisconsin or central Iowa. Ceramic decorative motifs and other attributes are generally considered to represent shared ideas that are communicated between people both within and among communities (Dermarker 2019; Griffin 1945; Hart et al. 2017; Hegmon 1992; Overstreet 2009; Rice 2015; Schneider 2015; Wiessner 1983, 1984, 1985). It seems likely that certain attributes (e.g., triangular-patterned punctates or grooved-paddled exterior surface) may indicate group identity or personal agency. These attributes provide an informational signal that the potters in one locality identify as separate from the potters in other localities across eastern Wisconsin (e.g., Wallis 2006; Wiessner 1983, 1984, 1985; Wobst 1977).

Along with these stylistic attributes, compositional analyses of pottery vessel paste and clay samples from each locality should indicate the level of interaction and

inclusiveness of the community of potters within and among these localities. Choices of paste recipes and clays provide information on the sharing and integration of ideas, while the location of clay sources may help determine if vessels were made and used locally or were physically moved between localities (Fie 2000; Fowles et al. 2007; Schneider 2015; Stoltman and Mainfort 2002; Stoltman et al. 2005).

### Eastern Oneota Pottery Types

The Carcajou series, first described by Hall (1962), is identified by transverse notching across the lip. The Carcajou series includes Carcajou Curvilinear, Carcajou Trailed (including both curvilinear and rectilinear motifs on the vessel shoulder), and Carcajou Plain type (Schneider 2015). The Grand River series is identified by undecorated lips. Grand River includes two types: Grand River Trailed and Grand River Plain. The Koshkonong Bold pottery type is identified by lip notching and broad (>10 mm) vertical lines on the shoulder of vessels (Boszhardt 1994; Hall 1962). The Busseyville Grooved Paddle type is now defined as a series that includes Busseyville Plain and Busseyville Trailed (cf. Hall 1962; Schneider 2015). The defining Busseyville attribute is a roughened exterior surface treatment made by either a grooved paddle or a rawhide cord-wrapped stick. Vessels with rectilinear and curvilinear patterns have been identified in assemblages with the roughened surface treatment (Figure 3.1).

Recent Oneota pottery research has identified a number of new pottery types (Carpiaux 2018; Schneider 2015; Schneider and Richards 2011). The primary attributes that define these types are differences in lip decoration, shoulder decoration, and the use of crimping on the upper interior and exterior portions of the rim. Crimping, which creates a wavy S-shaped lip, is associated with the Calumetville Crimped series: Calumetville Crimped Trailed and Calumetville Crimped Plain (Schneider and Richards 2011). Punctated lips are associated with the Schmeling series: Schmeling Plain and Trailed types. Two additional types include punctates in decorative motifs on the neck and shoulder. The Crescent Bay Punctate type has lip-notching modification, while the Edgerton Punctate type exhibits no lip decoration (see Figure 3.1; Schneider 2015).

### Temporal Significance and Spatial Distribution of Pottery in the Koshkonong Locality

The separation of Wisconsin Oneota pottery began with McKern (1945). He defined three separate Oneota foci in Wisconsin: the Orr focus in the west, the Grand River focus in the south-central region, and the Lake Winnebago focus in the east. The Lake Koshkonong and Green Bay “districts” (McKern 1945:127) yielded Oneota ceramics that he considered potentially different from these foci, but they were too poorly known to be accurately classified. McKern and Ritzenthaler (1945:68) provided a rudimentary Wisconsin chronology that suggested Upper Mississippian

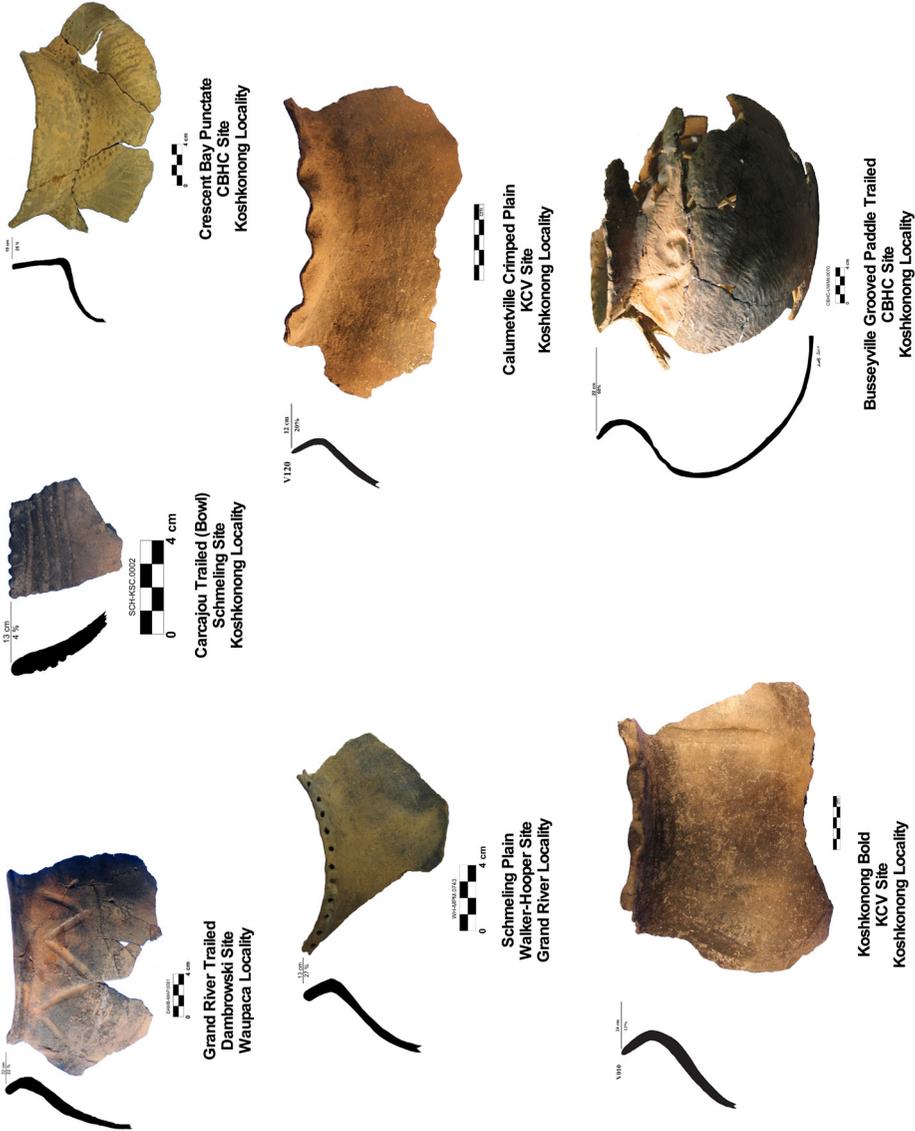


FIGURE 3-1. Selected Oneota pottery types from the three Oneota localities (Carpiaux 2018; Schneider 2015).

“culture” at circa AD 1000, with a later Middle Mississippian “culture” circa AD 1500. Hall (1962:105) largely agreed with McKern and Ritzenthaler’s chronology, arguing for both early and late Oneota components at the Carcajou Point site. He suggested that Carcajou and Grand River pottery vessels were made earlier than were Busseyville Grooved Paddle and Koshkonong Bold vessels. Hall also argued that certain vessel attributes on Carcajou vessels were earlier than others. For example, he considered Carcajou vessels with broad lip notches to be earlier than those with narrow lip notches.

In western Wisconsin, Boszhardt (1994) has argued that Allamakee Trailed and Koshkonong Bold pottery date to the sixteenth and seventeenth centuries. While that chronology may be accurate in the Mississippi River valley, a number of radiocarbon dates from contexts at the CBHC and KCV sites containing Koshkonong Bold vessels suggest that the type was in use two centuries earlier in eastern Wisconsin (Carpiaux 2018; Jeske et al., this volume).

Radiocarbon dates were obtained from organic residue on the interior of 19 vessels in the assemblages from the Crescent Bay Hunt Club (CBHC), Schmeling, and Koshkonong Creek Village (KCV) sites in the Koshkonong Locality (see Table 1.1; see Figure 1.2; Carpiaux 2018; Jeske 2008; Jeske, ed. 2003; Schneider 2015). Ten pottery vessels were identified as Grand River series, two as from the Carcajou series, five as from the Busseyville series, one as Schmeling Trailed, and one as Calumetville Crimped. All the dates are calibrated at 2- $\sigma$ . The Grand River series vessels range in date from AD 1050 to AD 1400, indicating Grand River vessels were used throughout the Oneota occupation in the Koshkonong Locality. The Carcajou series, Busseyville series, Schmeling Trailed, and the Calumetville Crimped Plain vessels range from the early thirteenth century into the fifteenth century. Altogether, 47 dates from Oneota contexts at the four sites excavated clearly define the beginning and end of the Oneota occupation of the locality (Jeske et al., this volume; Krus et al. 2019). There is no indication that a freshwater reservoir effect has affected these radiocarbon dates (see Jeske et al., this volume).

If ceramic types were tightly clustered chronologically, it is arguable that specific vessel pottery types should correlate with chronologically similar features or depositional episodes. However, most identified Oneota pottery types at KCV are not chronologically clustered (Carpiaux 2018:24–26). For example, Busseyville Grooved Paddle pottery types were recovered from multiple features spanning the entire occupation of the site (Figure 3.2). Spatial analysis of cultural material at CBHC conducted by Moss (2010) also indicated pottery types from feature contexts did not separate out across the site and multiple pottery types were recovered from the same depositional contexts within features. The spatial distribution of dated pottery types at the KCV and CBHC sites indicates that there is little temporal variation by pottery types in the Koshkonong Locality (Carpiaux 2018:24–27; Moss 2010).

Our data do not conform to the traditionally used horizon system (Emergent, Developmental, Classic, and Historic). Previously, researchers considered curvilinear decorative motifs, such as the interlocking scroll, to have dated to earlier than rectilinear motifs and grooved-paddle surface treatment to have appeared later than smooth-finished vessels (Hall 1962; Overstreet 1995, 1997). For example,

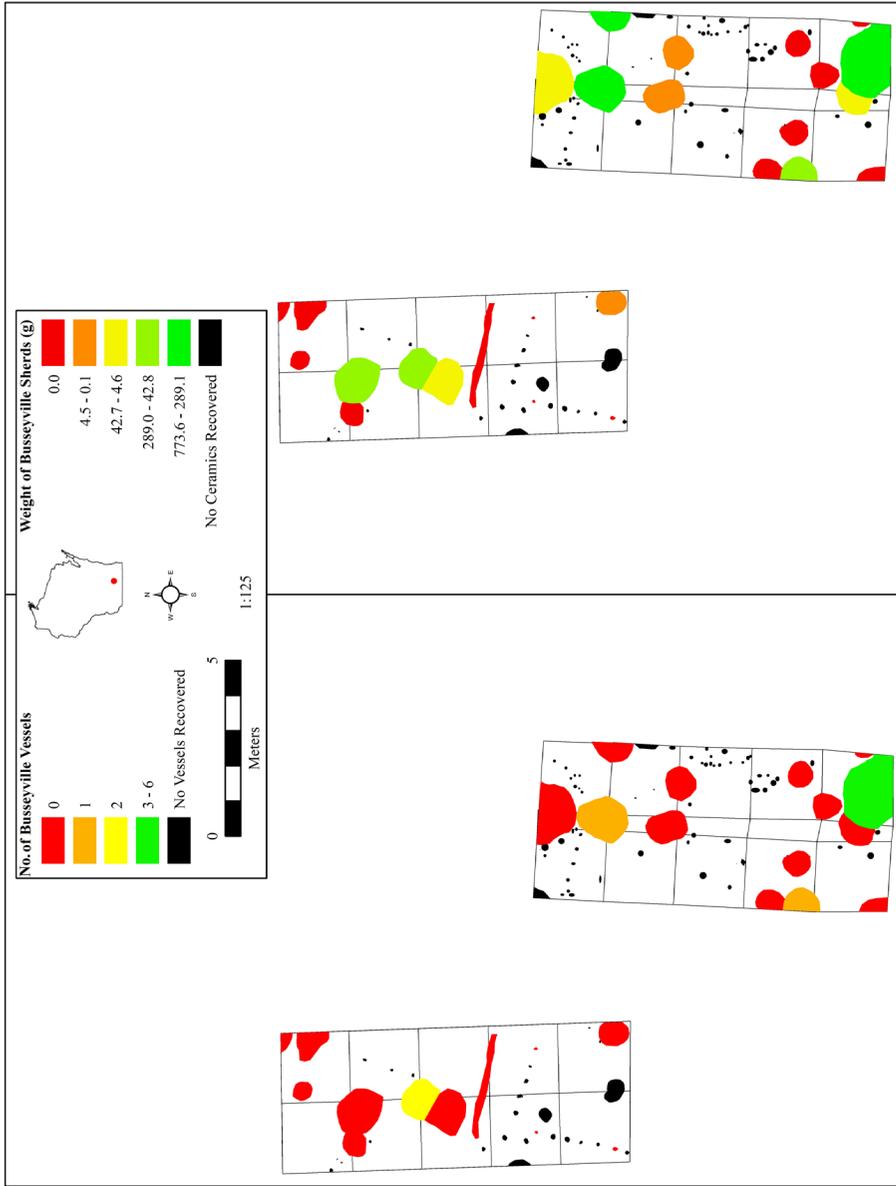


FIGURE 3.2. Spatial distribution of Busseyville ceramics among features from KCV, excavated from 2012 and 2014, by vessel count (*left*) and total sherd weight (*right*) (Carpioux 2018).

a Busseyville Grooved Paddle Trailed vessel from CBHC has both an interlocking scroll decorative motif and a grooved-paddle surface treatment (see Figure 3.1). The radiocarbon assay obtained from organic residue indicates that it dates to the mid-fourteenth century (see Table 1.1; Jeske 2008; Jeske et al., this volume; Schneider 2015; Sterner 2018). The spatial analysis at KCV indicates that Koshkonong Bold vessels, thought to be late, were recovered from features spanning the entire occupation of the site. The data thus far indicate that the horizon concept is not applicable to Wisconsin Oneota.

### Using Ceramic Attribute and Compositional Variations Between Localities to Determine Interlocality Interaction

For this analysis, a total of 1,390 vessels were identified in the ceramic assemblages from the three localities sampled, 434 of which could be identified to a defined type (Table 3.1). Vessel types were not significantly correlated with chronology. We hoped to get more fine-tuned data on the relationships of potters between localities, so we examined 65 decorative and morphological characteristics archaeologists have commonly used as proxies for information exchange (e.g., body morphology, rim stance, lip modification/decoration, surface treatment, decorative elements, and decorative motifs; Schneider 2015). A Pearson's chi-square was used to determine if significant differences in attributes were present between each locality. Lasso regression and forced comparison tests were run to determine the level of variation present between localities.

Pearson's chi-square analysis demonstrated that 31 of the 65 separate attributes of ceramic production and decoration showed significant difference at the 95% confidence level among the localities. These 31 were then submitted to lasso regression analysis, which indicated that 80% of the variation was explained by 11 of the attributes: temper type, temper amount, paste core, exterior surface treatment, exterior surface color, interior surface color, decorated, decorative motif, rim thickness, vessel size, and lip form. A forced comparison test was conducted to determine the degree of attribute variation among the 11 variables. The resulting plot diagram of the forced comparison between the Koshkonong and Grand River Localities shows that the grooved-paddle surface has a much higher degree of association with the Koshkonong Locality (LKL) than with the Grand River Locality (GRL; Figure 3.3). Note that of 8 variables shown, most attributes fall at or near 0, while the grooved-paddle surface treatment (GP) is strongly correlated with the Koshkonong Locality. No other attribute has such a strong association. The same distinction held true for a comparison of the Koshkonong and Waupaca Localities (Schneider 2015).

At the Koshkonong Locality, it is clear that potters chose to make vessels with grooved-paddle surface treatment in frequencies significantly higher than at the other two localities (Schneider 2015). In the Koshkonong Locality, 5% of all vessels have grooved-paddle surface treatment (Carpiaux 2018; Schneider 2015), while less than 1% of vessels in the Grand River and Waupaca Localities have the same surface treatment. The potters in the Koshkonong Locality appear to have used this conspicuous and visually distinctive surface treatment as a marker of

TABLE 3.1

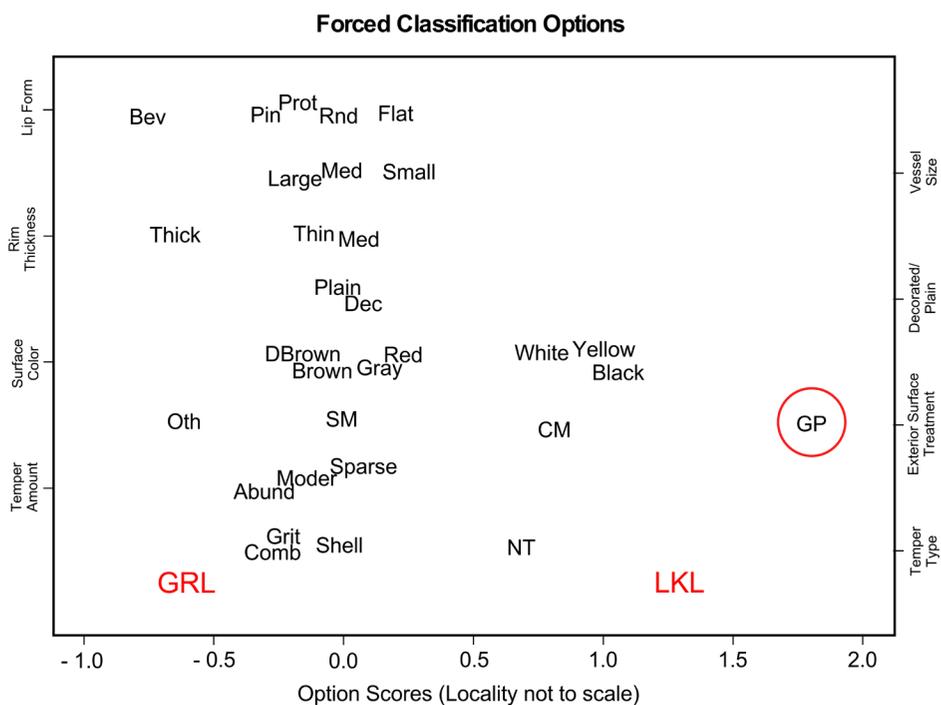
POTTERY TYPES BY LOCALITY EXCLUDING KOSHKONONG CREEK VILLAGE (SCHNEIDER 2015).

Pottery Types	Koshkonong Locality		Waupaca Locality		Grand River Locality		Grand Total	% of All Assemblages
	<i>n</i>	% by Locality	<i>n</i>	% by Locality	<i>n</i>	% by Locality		
Carcajou Plain	9	2.7	6	3.3	61	7.0	<b>76</b>	<b>5.5</b>
Carcajou Trailed	10	3.0	3	1.7	14	1.6	<b>27</b>	<b>1.9</b>
<b>Total</b>	<b>19</b>	<b>5.7</b>	<b>9</b>	<b>5.0</b>	<b>75</b>	<b>8.6</b>	<b>103</b>	<b>7.4</b>
Grand River Plain	26	7.8	52	28.7	119	13.6	<b>197</b>	<b>14.2</b>
Grand River Trailed	19	5.7	7	3.9	40	4.6	<b>66</b>	<b>4.7</b>
<b>Total</b>	<b>45</b>	<b>13.5</b>	<b>59</b>	<b>32.6</b>	<b>159</b>	<b>18.2</b>	<b>263</b>	<b>18.9</b>
Calumetville Crimped Plain	0	0.0	4	2.2	4	0.5	<b>8</b>	<b>0.6</b>
Calumetville Crimped Trailed	1	0.3	0	0.0	2	0.2	<b>3</b>	<b>0.2</b>
<b>Total</b>	<b>1</b>	<b>0.3</b>	<b>4</b>	<b>2.2</b>	<b>6</b>	<b>0.7</b>	<b>11</b>	<b>0.8</b>
Schmeling Plain	0	0.0	1	0.6	3	0.3	<b>4</b>	<b>0.3</b>
Schmeling Trailed	1	0.3	0	0.0	2	0.2	<b>3</b>	<b>0.2</b>
<b>Total</b>	<b>1</b>	<b>0.3</b>	<b>1</b>	<b>0.6</b>	<b>5</b>	<b>0.5</b>	<b>7</b>	<b>0.5</b>
Busseyville Plain	4	1.2	0	0.0	2	0.2	<b>6</b>	<b>0.4</b>
Busseyville Trailed	3	0.9	0	0.0	0	0.0	<b>3</b>	<b>0.2</b>
<b>Total</b>	<b>7</b>	<b>2.1</b>	<b>0</b>	<b>0.0</b>	<b>2</b>	<b>0.2</b>	<b>9</b>	<b>0.6</b>
Koshkonong Bold	2	0.6	0	0.0	1	0.1	<b>3</b>	<b>0.2</b>
Lasley Negative Paint	0	0.0	0	0.0	2	0.2	<b>2</b>	<b>0.1</b>
Crescent Bay Punctate	6	1.8	2	1.1	4	0.5	<b>12</b>	<b>0.9</b>
Edgerton Punctate	5	1.5	4	2.2	10	1.1	<b>19</b>	<b>1.4</b>
<b>Total</b>	<b>13</b>	<b>3.9</b>	<b>6</b>	<b>3.3</b>	<b>17</b>	<b>1.9</b>	<b>36</b>	<b>2.2</b>
Grand River Noded	0	0.0	1	0.6	2	0.2	<b>3</b>	<b>0.2</b>
Carcajou Noded	0	0.0	0	0.0	2	0.2	<b>2</b>	<b>0.1</b>
<b>Total</b>	<b>0</b>	<b>0.0</b>	<b>1</b>	<b>0.6</b>	<b>4</b>	<b>0.4</b>	<b>5</b>	<b>0.4</b>
Fisher Plain	1	0.3	1	0.6	2	0.2	<b>4</b>	<b>0.3</b>
Fisher Trailed	2	0.6	0	0.0	0	0.0	<b>2</b>	<b>0.1</b>
<b>Total</b>	<b>3</b>	<b>0.9</b>	<b>1</b>	<b>0.6</b>	<b>2</b>	<b>0.2</b>	<b>6</b>	<b>0.4</b>
Indeterminate Undecorated Lip	152	45.5	84	46.4	401	45.8	<b>637</b>	<b>45.8</b>
Indeterminate Notched Lip	64	19.2	9	5.0	164	18.7	<b>237</b>	<b>17.1</b>
Indeterminate Crimped Lip	4	1.2	3	1.7	28	3.2	<b>35</b>	<b>2.5</b>
Indeterminate Punctate Lip	10	3.0	1	0.6	9	1.0	<b>20</b>	<b>1.4</b>
Indeterminate Noded	1	0.3	1	0.6	0	0.0	<b>2</b>	<b>0.1</b>
Indeterminate Grooved Paddle	14	4.2	1	0.6	3	0.3	<b>18</b>	<b>1.3</b>
Indeterminate Grit-Tempered Trailed	0	0.0	1	0.6	0	0.0	<b>1</b>	<b>0.1</b>
<b>Grand Total</b>	<b>334</b>	<b>100</b>	<b>181</b>	<b>100</b>	<b>875</b>	<b>100</b>	<b>1,390</b>	<b>100</b>
<b>% of All Assemblages</b>	<b>24.1</b>		<b>13.0</b>		<b>62.9</b>		<b>100</b>	

Source Schneider 2015.

group identity (e.g., Wobst 1977). This visual distinction of otherwise similar vessel types is reminiscent of the Langford and Fisher division in northern Illinois, where the use of black mafic grit pottery or shell pottery distinguishes contemporaneous groups on the landscape (Jeske 2003b).

Decorative motifs also serve to communicate ideas of identity. Social-networking analyses of decorative motifs have recently been used to infer the level of social interaction between Iroquoian groups (Birch and Hart 2018; Hart and Engelbrecht 2012; Hart et al. 2016; Hart et al. 2017; Hart et al. 2019). Oneota vessels display



**FIGURE 3.3.** Forced comparison of pottery attributes between the Grand River Locality (GRL) and Koshkonong Locality (KL). Grooved-paddle surface treatment plots almost 2 degrees from zero indicate a very strong association with the Koshkonong Locality (Schneider 2015).

a wide variety of distinctive decorative motifs, including curvilinear and rectilinear chevrons, incised lines, and interlocking scrolls. However, in eastern Wisconsin, only five decorative motifs are shared by all the localities (Figure 3.4). Three additional motifs are shared between the Waupaca and Grand River Localities. Five motifs are shared only between the Grand River and Lake Koshkonong Localities. Although similar decorative elements are used by the potters in each locality, they chose between the elements to generate different motifs seen on Oneota pottery vessels.

Compositional analysis utilizing ceramic petrography was conducted on pottery vessels and clay samples from the three localities using the point-counting method proposed by Stoltman (1989, 1991a). Information about body composition was compiled by counting the number of points landing on matrix (clay and silt), sand, and temper. These counts represent the recipe used to produce the vessels. When plotted on a ternary diagram, the vessels from the three localities do not separate out, which indicates that the potters used similar recipes in processing and mixing production materials (Figure 3.5). Paste composition information was compiled by examining the natural mineralogy of clay, silt, and sand in the sherd (sans temper). Paste composition does differ between the Koshkonong Locality and the other two localities, with the Koshkonong Locality vessels displaying a higher proportion of silt (Figure 3.6). This result suggests that most vessels were made and used within

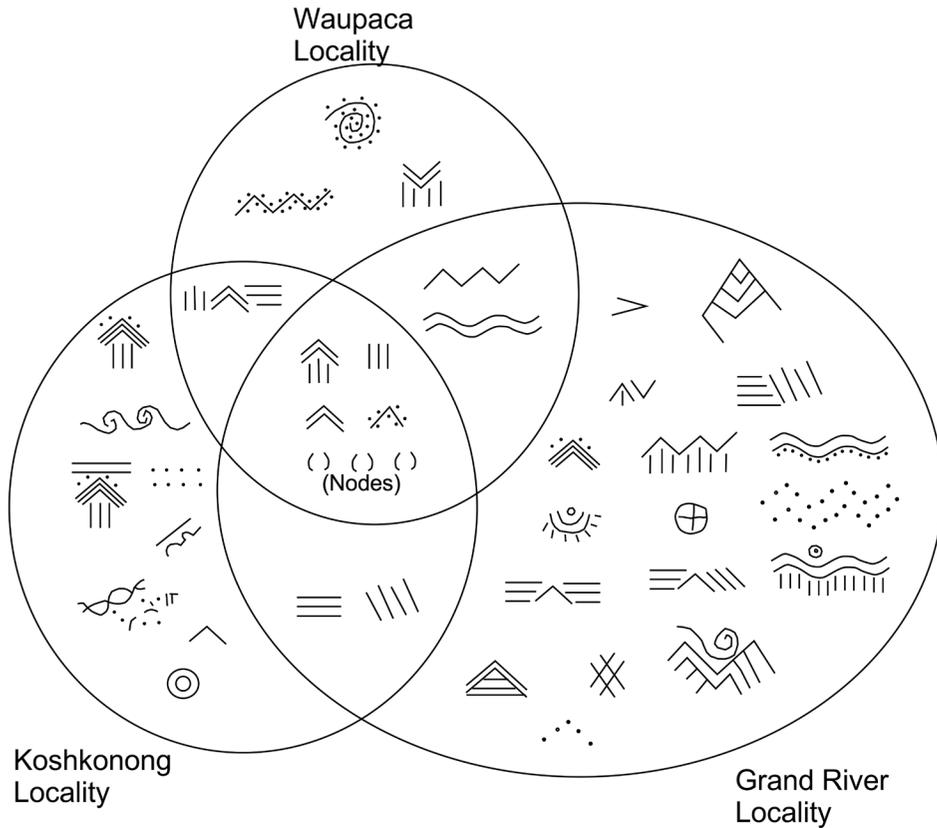


FIGURE 3.4. Venn diagram showing the shared decorative motifs among the three Oneota localities in eastern Wisconsin (Schneider 2015).

the same locality. The lack of vessel exchange arguably suggests limited social interaction between people in these localities.

Returning to our research questions, the residents of the localities appear to have been relatively isolated. There are significant variations between attributes of vessel form, decoration, and raw materials, which indicate distinct craft traditions existed in each of the localities. However, the broad degree of similarity in ceramics among the localities indicates a shared general identity across eastern Wisconsin.

## Discussion

Four questions were raised in this article that pertain to eastern Wisconsin Oneota pottery types: Are temporal markers present in the pottery assemblage at the KCV site? How isolated were the eastern Wisconsin Oneota localities? Was there movement of people between localities, suggesting economic and social exchange? Does the space between the localities represent no-man's-lands or political buffer zones?

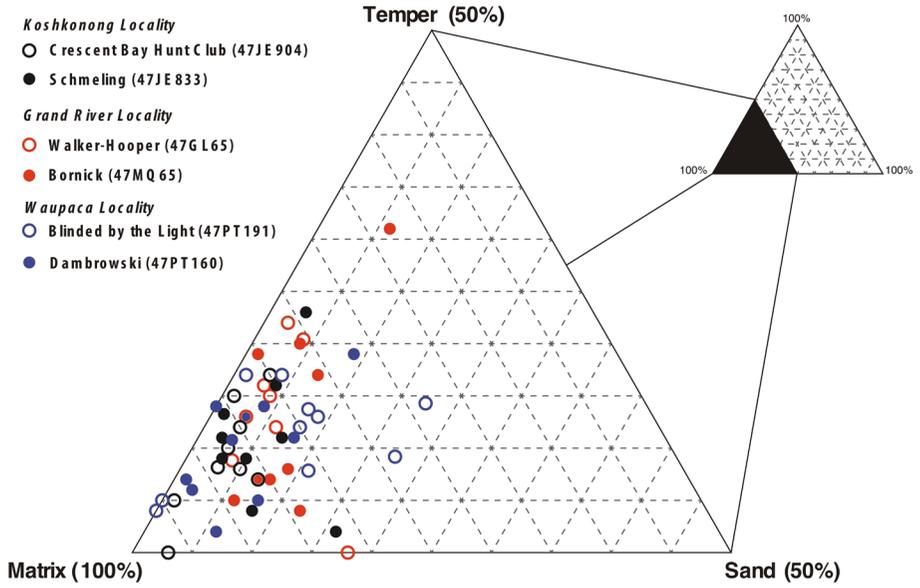


FIGURE 3.5. Ternary diagram of point-count data for body composition from ceramic petrography analysis of vessels in the Koshkonong, Grand River, and Waupaca Localities (Schneider 2015).

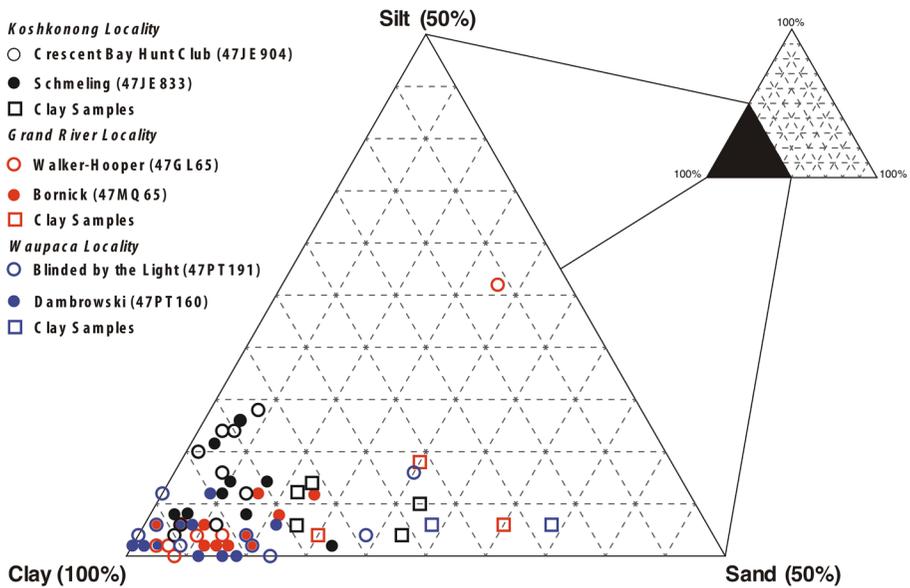


FIGURE 3.6. Ternary diagram of point-count data for pastes composition from ceramic petrography of vessels and clay samples collected within and near the three localities (Schneider 2015).

Based on the spatial distribution, vessel attribute, and compositional studies above, we can provide some insights on the answers to the questions.

1. Do Oneota pottery types at Koshkonong vary chronologically in a distinct and systematic way?

Radiocarbon assays indicate that Koshkonong Oneota villages date from AD 1050 to AD 1430. The spatial distribution analysis of the pottery assemblages from KCV and CBHC indicates that there is no systematic temporal variation in pottery types. Most pottery types are present in features dating throughout the occupation of the sites (Carpiaux 2018; Moss 2010). The continuity of pottery styles is likely present in other eastern Wisconsin Oneota localities, but spatial distribution studies such as that in the Koshkonong Locality have yet to be conducted.

2. Do ceramic styles and manufacturing practices from sites in the three localities vary in a way that indicates potters in eastern Wisconsin Oneota localities were largely isolated from one another?

Eastern Wisconsin Oneota potters used paste recipes that were generally similar in that the ratio of shell temper, natural inclusions, and clay are consistent (see Figure 3.3). In addition, some attributes, such as the ubiquity of smoothed surface globular jars and a number of decorative motifs, demonstrate that Lake Koshkonong potters engaged in a larger network of shared concepts or information (see Figure 3.4). Moreover, the shell-tempered recipe in eastern Wisconsin is distinct from that of neighboring contemporaneous ceramics, such as Fisher vessels in northeastern Illinois and Middle Mississippian vessels. For example, Middle Mississippian vessels average 15% temper in body composition, while eastern Wisconsin Oneota pots average less than 10% temper in body composition (Richards and Schneider 2008; Richards et al. 2010; Schneider 2015; Stoltman 1991a).

However, the large number of decorative motifs not shared by each group suggests a significant degree of isolation and group autonomy. The decorative elements used to generate the motifs are universal, but the motifs created using those elements differ widely between localities. The differences in pottery assemblages from these three Oneota localities demonstrate that the localities display individual group identities that distinguish them from each other. Paste composition analysis also demonstrates potters at each locality used local clays that did not share the same characteristics with clays from other localities. In particular, Koshkonong Locality potters used clays containing a higher percentage of silt than did potters in the other localities. The limited use of grooved-paddle surface treatment in the other two localities suggests that, while being a signature of the Koshkonong Locality, the technique was brought to these localities through some form of social interaction, such as marriage exchange, emulation, and so on. However, in large part, potters in the other localities appear to have rejected or ignored the technique.

In sum, it appears that the people in the three localities maintained a large degree of isolation and social autonomy. The Koshkonong Locality potters' use of the

Busseyville surface treatment is a clear visual marker of a localized Koshkonong Locality ceramic technology and, presumably, some form of localized identity.

3. If the pottery styles and manufacturing techniques do not vary significantly, do the pottery assemblages from the sites in the three separate areas indicate (a) exchange of goods, (b) movement of members into groups, (c) some other type of exchange, or (d) independent agency?

Economic interaction in the form of regular trade is not evident in the ceramic petrography ternary plots (see Figures 3.5 and 3.6). However, low levels of social interaction appear to have been maintained based on the low frequency of grooved-paddle surface treatment in the Grand River and Waupaca Localities. Individuals may have moved into these localities from the Koshkonong Locality or visitors may have taken this particular surface treatment method and shared it with potters in their localities.

4. If the pottery styles and manufacturing techniques do vary significantly, does the seemingly isolated nature of Oneota sites in the three localities indicate social and political boundaries that create distinct identities or ethnicities (cf. Emerson 1999:38; Gibbon 1972b:175; Jeske 1990, 1992b; Richards and Jeske 2002:47)?

The distance between the three Oneota localities in eastern Wisconsin suggests that these people were focused on maintaining large uninhabited regions surrounding clustered villages. The pottery attribute and compositional analyses in this study do indicate that the potters of the Koshkonong Locality maintained a degree of separation from other potters. Consistent with the buffer zones proposed by Emerson (1999) and Jeske and colleagues (this volume), the differences in ceramic attributes suggest the formation of local identities and boundaries, albeit fluid, nested, and permeable. Social connections such as those produced by marriage, exchange, or ceremonial gatherings between localities are not ruled out entirely (cf. Hall 1997).

## Conclusions

In sum, the ceramic data are consistent with local groups forging and maintaining ethnic identities and boundaries. Our results are consistent with other data sets that indicate that *Oneota* must be treated as a vague term that does not encapsulate the lived experiences of individuals in multiple geographic settings across the northern portion of the Prairie Peninsula.

## Acknowledgments

We would especially like to thank the members of the Crescent Bay Hunt Club and the Weisensel family. The Milwaukee Public Museum, Wisconsin Historical

Society, and Department of Anthropology at the University of Wisconsin–Madison are thanked for allowing us access to the pottery assemblages from the sites in the Grand River and Waupaca Localities.

## Notes on Contributors

### *Seth A. Schneider*

ORCID 0000-0002-0796-8036 — Schneider received his PhD in 2015 from the University of Wisconsin–Milwaukee. His research interests are western Great Lakes archaeology, ceramic analysis, and paste compositional analysis. Currently, he works as a project manager/archaeologist for the Cultural Resource Management program in the Department of Anthropology at the University of Wisconsin–Milwaukee. He is president of the Wisconsin Archeological Survey and active in the Wisconsin Archeological Society.

### *Natalie A. Carpiaux*

Carpiaux has a master's degree in anthropology from the University of Wisconsin–Milwaukee. Her research interests include prehistoric ceramics, ceramic conservation, and Oneota domestic activities. She is currently an archaeologist at UW–Milwaukee Cultural Resource Management.

## 4

# Risky Landscapes: Agriculture and Risk Management in Upper Mississippian Societies

Richard W. Edwards IV

*COMMONWEALTH HERITAGE GROUP, MILWAUKEE; DEPARTMENT OF ANTHROPOLOGY, UNIVERSITY OF WISCONSIN–MILWAUKEE*

Subsistence systems have an inherent level of risk for failure, famine, and other calamities. An analysis of Oneota (ca. AD 1050–1430) settlement-subsistence systems can highlight the nature of the risks faced by Late Prehistoric peoples and can identify the strategies employed to mitigate them. In turn, this can provide details about the nature of social and political networks. This research uses macrobotanical, stable isotope, and settlement-system data to examine Oneota risk-management strategies. In the Koshkonong Locality, results of an analysis of the settlement-subsistence system reflect the social and environmental factors that encouraged the development of a defensive posture, strong intragroup cooperation, and relative social isolation.

**KEYWORDS** Oneota; Stable Isotope Analysis; Canine Surrogacy Approach; Prehistoric Risk-Management Strategies; Paleoethnobotany; Prehistoric Agriculture

## Introduction

Researchers have long examined Upper Mississippian subsistence systems as a means of inferring details about economics and sociopolitical relationships (e.g., Gibbon 1972b; Jeske 1989; McKern 1945; Overstreet 1976; Sasso 1989, 2003). In northern Illinois and Wisconsin, the term *Upper Mississippian* includes a number

of regionalized archaeological manifestations, including Langford, Fisher, and Oneota (Emerson 1999:3; Emerson et al. 2010:2; Gibbon 1972b:167–168; Hollinger 2005:34; Jeske 2000:265; McKern 1945:161; O’Gorman 2010:578; Overstreet 2000:410). However, subsistence data that are both fine grained and comparable among localities were scant, leading many investigators to debate the nature of the Oneota economy (see Brown 1982). Were Oneota economies generally agricultural or horticultural—that is, how important were cultivated crops to the economy? Were Oneota economies diverse (Brown 1982; Michalik 1982; Overstreet 1981), focused (Gibbon 1986), or somewhere in between (Gallagher and Arzigian 1994; Overstreet 1997)? Superficially, the answers to these questions heavily affect interpretations of group organization, size, and sedentism. For more in-depth analyses, the answers play an important role in understanding intragroup cohesion, intergroup dynamics, and regional political/economic systems (see Halstead and O’Shea 1989; Halstead and O’Shea, ed. 1989). Using a risk-management framework, I integrate macrobotanical, stable isotope, and settlement system analyses to make inferences about the economics and politics of Oneota groups across southern Wisconsin.

## Risks and Risk-Management Systems

### Risk

Risk is a fundamental aspect of all subsistence systems (e.g., Kipnis 2002). Environmental and social factors capable of threatening food supplies are omnipresent facts of life. Risks vary in their temporality, geographic scope, severity, and source (for a full discussion, see Halstead and O’Shea 1989). For example, the timing of seasonal changes is relatively predictable and geographically broad, though the severity of the seasons is annually variable. The timing of storms is less predictable, though they are more geographically restricted, and their severity is variable. Cultural factors, like enemy raids, are geographically focused, but it can be difficult to predict their timing, location, and severity. To mitigate the likelihood of starvation, groups typically implement risk-management strategies—techniques aimed at reducing the impacts of the various risks at hand (Halstead and O’Shea 1989; Halstead and O’Shea, ed. 1989; Marston 2011).

### *Risk-Management Strategies*

Social scientists have identified numerous buffering mechanisms—for example, Halstead and O’Shea (1989) identified six general strategies that may be visible within the archaeological record (Table 4.1). Other scholars have developed specific categorization systems that are applicable to particular types of subsistence systems or regions (e.g., Gallagher and Arzigian 1994). For example, Marston (2011) categorized subsistence strategies that are applicable in agricultural settings. Regardless of the organization schema, risk-management strategies all have the common goal of mitigating variable resource returns to ensure survival. The source and nature of the variation will shape the mitigation response (Halstead and O’Shea 1989; Hart 1993).

TABLE 4.1.

## RELEVANT RISK-MANAGEMENT STRATEGIES.

Strategy	Citation	Description
Mobility	Halstead and O'Shea (1989)	Movement to areas with better resources
Diversification		Increase diet breadth and/or environments exploited
Exchange		Obtain resources from neighbors with access to different suite of resources, through trade
Storage		Maintenance and caching of food for later consumption
Raiding		Obtain resources from neighbors with access to different resources, violently
Diversification <ul style="list-style-type: none"> <li>• Agricultural</li> <li>• Spatial</li> <li>• Temporal</li> </ul>	Marston (2011)	<ul style="list-style-type: none"> <li>• Cultivate multiple varieties of plants or multiple different plants</li> <li>• Grow crops in variable settings (e.g., elevations, edaphic settings, etc.)</li> <li>• Storage, crop scheduling, etc.</li> </ul>
Intensification <ul style="list-style-type: none"> <li>• Overproduction</li> <li>• Water Management</li> </ul>		<ul style="list-style-type: none"> <li>• Suite of strategies that raise production per land unit</li> <li>• Plant more than can be consumed</li> </ul>

## Expectations

Not all buffering techniques can be easily integrated into a single subsistence system. For example, Halstead and O'Shea (1989:3–4) argue that mobility and diversification often work well together—as people move across the landscape, the number of foods accessible typically increases, enabling further diversification. However, if mobile groups move before stored food resources can be consumed, then significant investment in storage is likely to be counterproductive.

Ethnohistoric and ethnographic knowledge of buffering techniques allows archaeologists to infer risk-managing behavior based on patterns of archaeological data. In addition, they can make inferences about the social and physical contexts in which these behaviors occurred. In turn, this provides insight into the choices made by people to mitigate specific risks. Because every risk cannot be managed simultaneously, the choices also reflect, in part, people's perceptions of the severity of risks. The threats that are perceived as most dangerous (i.e., deadly or likely to induce famine) are those for which people are most likely to employ buffering strategies. For example, Hart (1993) suggested that within the North American Eastern Woodlands, most environmental food shortages are best mitigated by increasing group mobility and other complementary buffering strategies. Given the heterogeneity of environmental zones in the Eastern Woodlands, larger territories allow for increased diet breadths and the potential to access sources of food unaffected by localized events. Access to multiple niches can help mitigate both large-scale and local risks.

Conversely, the risk of food shortages from intergroup conflict tends to generate very different responses. Because there is strength in numbers, the threat of attack will often be mitigated by aggregating populations. Further security can be obtained by minimizing trips away from settlements and traveling in larger groups

to avoid ambushes (Keeley 2003, 2016; Milner 2007; Milner et al. 1991b; VanDerwarker and Wilson 2016).

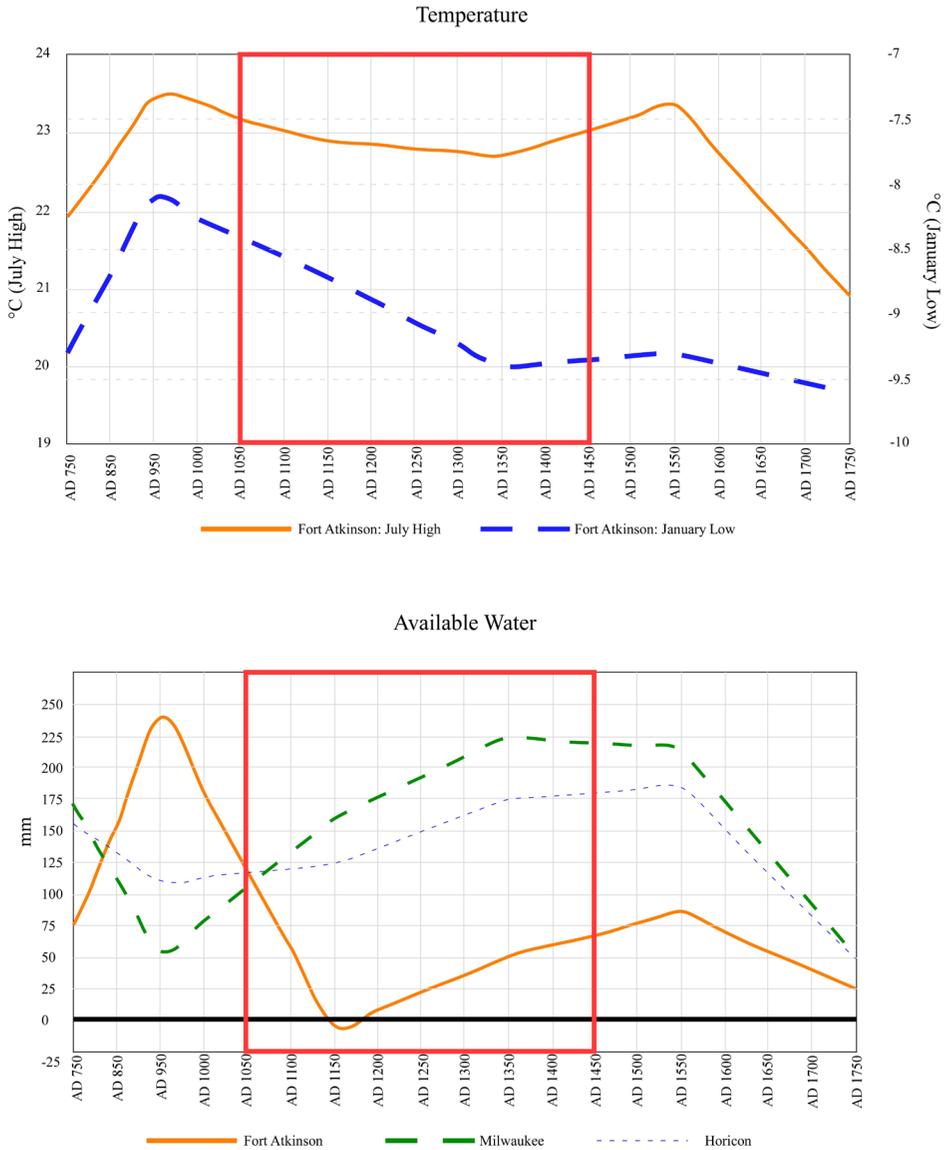
Population aggregation may result in decreased mobility and catchment size, depleting resources at relatively rapid rates. Therefore, intensive subsistence strategies that increase the food return rates per unit of land are essential (VanDerwarker and Wilson 2016; Winterhalder and Goland 1997). Because environmental and social threats have unique buffering signatures, it is possible to identify shifting risk sources through time by assessing variation in mitigation strategies (Hart 1993). These strategies are best assessed using multiple lines of evidence.

If severe environmental factors are of greater concern than social risks, then we should see the institutionalization of several strategies, particularly mobility, diversification, and exchange (*sensu* Halstead and O'Shea 1989). Archaeologically, this system should manifest as greater numbers of sites being occupied for shorter amounts of time, reflecting greater residential mobility. Or we should expect to see an increase of long-distance resource camps associated with small villages or base camps, reflecting greater logistical mobility (*sensu* Binford 1980). The subsistence data should indicate a broad diet with many food resources. Any evidence for exchange and interaction should show cooperation and trade with groups outside the immediate geographic region so that localized environmental events would have been less likely to have affected trade partners as well.

During periods in which severe social conflict is the primary concern, groups should institute strategies involving intensification and storage (*sensu* Halstead and O'Shea 1989). Archaeological manifestations of these patterns should be evident—as people aggregate, there should be larger and/or fewer village sites that are occupied for longer periods of time—potentially in defensive locations. That is, habitations would have been in places that were difficult to attack or that provided clear lines of sight in order to spot enemy advances. Storage features should be large, numerous, or both. Subsistence data should reflect a relatively narrow diet breadth that is focused on locally available resources. Evidence of habitat manipulation to increase resource yields may also be expected.

## Risks in Late Prehistory

Oneota groups in southern Wisconsin faced a variety of environmental and social risks. Typical environmental factors were exacerbated by the onset of the Little Ice Age (Baerreis and Bryson 1965; Baerreis et al. 1976; Griffin 1960b), which magnified seasonal extremes, reduced predictability, and intensified storms (Figure 4.1). Furthermore, the risk of raiding was higher than during preceding time periods—with phases of violence leading to heavy casualties; in some regions one in three adults died violently (Karsten 2015; Milner et al. 1991b). These risks not only reduced labor pools, but they also forced some groups to significantly modify their subsistence regimes, mobility patterns, and group organization to respond to the risk of violent death (e.g., Milner 2007; Milner et al. 1991b; VanDerwarker and Wilson 2016). While these risks for Oneota groups are known, their impacts are often poorly understood, particularly their systemic effects.



**FIGURE 4.1.** Variation in temperature (*top*) and precipitation (*bottom*) in southeastern Wisconsin through time (after McEnaney and Bryson 2005).

To understand these impacts, I focus on the subsistence system of the occupants in the Koshkonong Locality. I contextualize my analysis within the regional political landscape of the northern edge of the Prairie Peninsula. In particular, I focus on analyzing paleobotanical and isotopic data from several Upper Mississippian sites to establish comparative baseline subsistence patterns. When the subsistence and settlement data are combined, it is possible to infer not only the types of risk-management strategies employed by each group but also the source of risks and the nature of the social structures that maintained the strategies.

## *Sampling and Methods*

### **Paleobotanical Methods**

The Koshkonong Locality data set includes samples from Crescent Bay Hunt Club (CBHC) and Koshkonong Creek Village (KCV). In total, 41 contexts from 16 features and more than 3,700 liters of floted sediment compose the data set. Identification methods generally follow those described by Pearsall (2010) and Egan-Bruhy (2010a). The majority of contexts were analyzed by the author, but several were previously analyzed (Egan-Bruhy 2001a; Olsen 2003). Large contexts (greater than 25 liters) were typically subsampled using a riffle sorter. Counts and weights for the full context were then extrapolated based on the subsample.

Seeds and other edible floral remains were identified as precisely as possible without sacrificing accuracy. Identifications were made conservatively to avoid false precision. Light fraction samples were sorted by size grade. Identifications were made using modern comparative samples collected by the author, archaeological materials from CBHC previously analyzed by Kathryn Egan-Bruhy (2001a), and seed identification manuals (Deloit 1970; Fritz ca. 2006.; Martin and Barkley 1961; Montgomery 1977). All materials larger than 2.0 mm were analyzed and counted. Charcoal, maize, nutshell, and all nonseed remains in this size category were also weighed (to nearest 0.001 g). Seeds larger than 0.5 mm were counted but not weighed. Nonseeds and maize kernels between 0.5 mm and 2.0 mm were not analyzed, including nutshell. Heavy fraction samples smaller than 2.0 mm were not analyzed. Materials larger than 2.0 mm were scanned for charred botanical remains, which were identified using the same procedures as the light fraction. The Koshkonong Locality sample is compared with published data sets from multiple Upper Mississippian assemblages (Egan 1988, 1993; Egan-Bruhy 2010a, 2010b; Egan-Bruhy and Nelson 2014; O’Gorman 1993, 1994, 1995; Schirmer 2002).

### **Isotopic Analysis**

Two stable isotopes were chosen for analysis: nitrogen-15 ( $\delta^{15}\text{N}$ ) and carbon-13 ( $\delta^{13}\text{C}$ ). These isotopes reflect broad dietary patterns over time (Ambrose 1987; Harkness and Walton 1972; Libby et al. 1964; Stenhouse and Baxter 1977, 1979), where  $\delta^{13}\text{C}$  reflects the amount of  $\text{C}_4$  plants (Farquhar et al. 1989) and  $\delta^{15}\text{N}$  reflects trophic level (Ambrose and DeNiro 1986; Schoeller 1999). Since maize is the dominant prehistorically consumed  $\text{C}_4$  plant in the region,  $\delta^{13}\text{C}$  reflects maize consumption (Bender et al. 1981). It should be noted that purslane (*Portulaca oleraca*) is also a  $\text{C}_4$  plant (Tankersley et al. 2016), but the entire macrobotanical data set includes five seeds from one site. Given the paucity of purslane remains, it was not likely consumed to any significant degree and should not have an impact on the  $\delta^{13}\text{C}$  values. The  $\delta^{15}\text{N}$  acts as a proxy for meat/fish consumption (Ambrose 1987; Ambrose and Norr 1993).

Traditionally in the Midwest, isotope analyses are performed using human skeletal remains (e.g., Bender et al. 1981; Buikstra et al. 1994; Emerson et al. 2005; Emerson et al. 2010; Pratt 1994). However, ethical and legal considerations often make it difficult to obtain permission to conduct destructive tests on human remains. Alternatively, associated dog remains can be used as a proxy. The close

relationship between humans and dogs, their sharing of food, and the consumption of human food waste and feces by dogs can result in comparable isotope levels, that is, statistically similar results (Burleigh and Brothwell 1978; Cannon et al. 1999; Guiry 2012, 2013). The use of dog isotope values as a proxy for human isotope values is known as the canine surrogacy approach (CSA). CSA has been used globally (Guiry 2012, 2013) and has been demonstrated to work in the Midwest (Edwards et al. 2017; Tankersley and Koster 2009).

Nineteen dogs from nine Late Prehistoric sites across Wisconsin and northern Illinois were sampled for this study, representing every Upper Mississippian dog I could access. Isotopic analysis was conducted by Joan Coltrain at the University of Utah. The data from the dogs were compared to previously published human values from northern Illinois and southern Wisconsin (Emerson et al. 2005; Emerson et al. 2010; Pratt 1994).

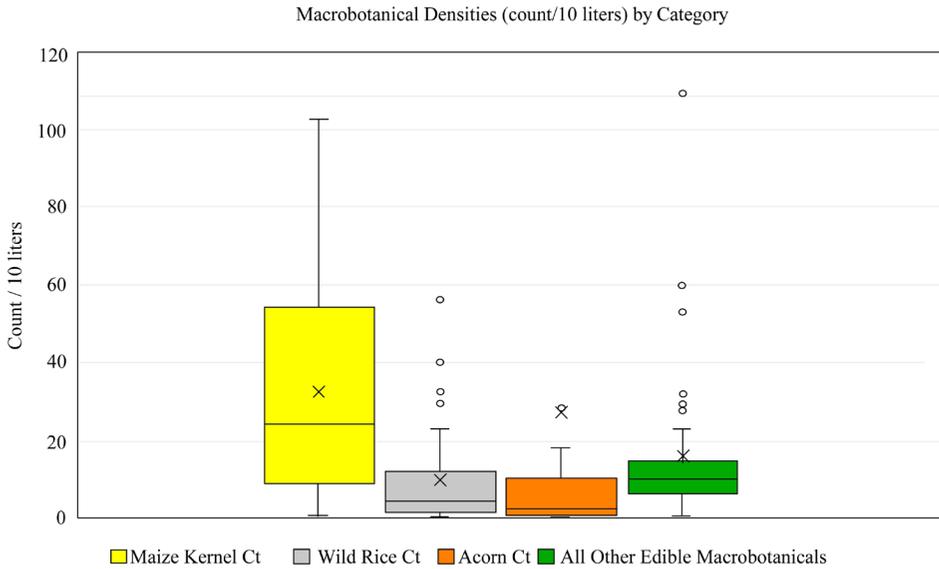
## Analysis and Results

### *Macrobotanical Data*

In the analyzed sample, three resources stand out: maize, wild rice, and acorn (Figure 4.2). In the Koshkonong Locality, the strong reliance on maize, and potentially wild rice, is supported by bioarchaeological data. High rates of dental caries are present on human remains identified from sites in the locality and are statistically higher than in the Middle Fox Locality or at Aztalan (Karsten et al. 2019). These three plants have high ubiquity and density values relative to other taxa, indicating that they were likely important aspects of the local diet. However, the samples may overstate the importance of acorn. Unlike maize and wild rice, which are primarily represented by edible portions of the plants, acorn is primarily identified by nutshell, the nonedible waste portion of the plant. Whereas a majority of maize (i.e., kernels) and wild-rice remains are the results of accidental loss during cooking, the majority of the nutshell is the result of processing. Additionally, while acorn is highly ubiquitous, its densities are inconstant. A few contexts from both sites account for the majority of the acorn shell—potentially indicating that under normal circumstances it was processed in relatively small amounts.

Other significant resources include chenopodium, squash, and beans. Chenopodium is found in relatively high densities and ubiquities at CBHC and in modest levels at KCV. Both sites have small amounts of squash and beans, but their metrics likely underestimate the importance of the crops. Many squash-processing techniques limit the exposure of squash remains to fire and, therefore, decrease the likelihood that they will enter the archaeological record. Burnt squash and bean remains are easily damaged and destroyed, making recovery and identification difficult (Toll 1988). Both resources were almost certainly more significant than their low metrics suggest, but to what degree is unclear.

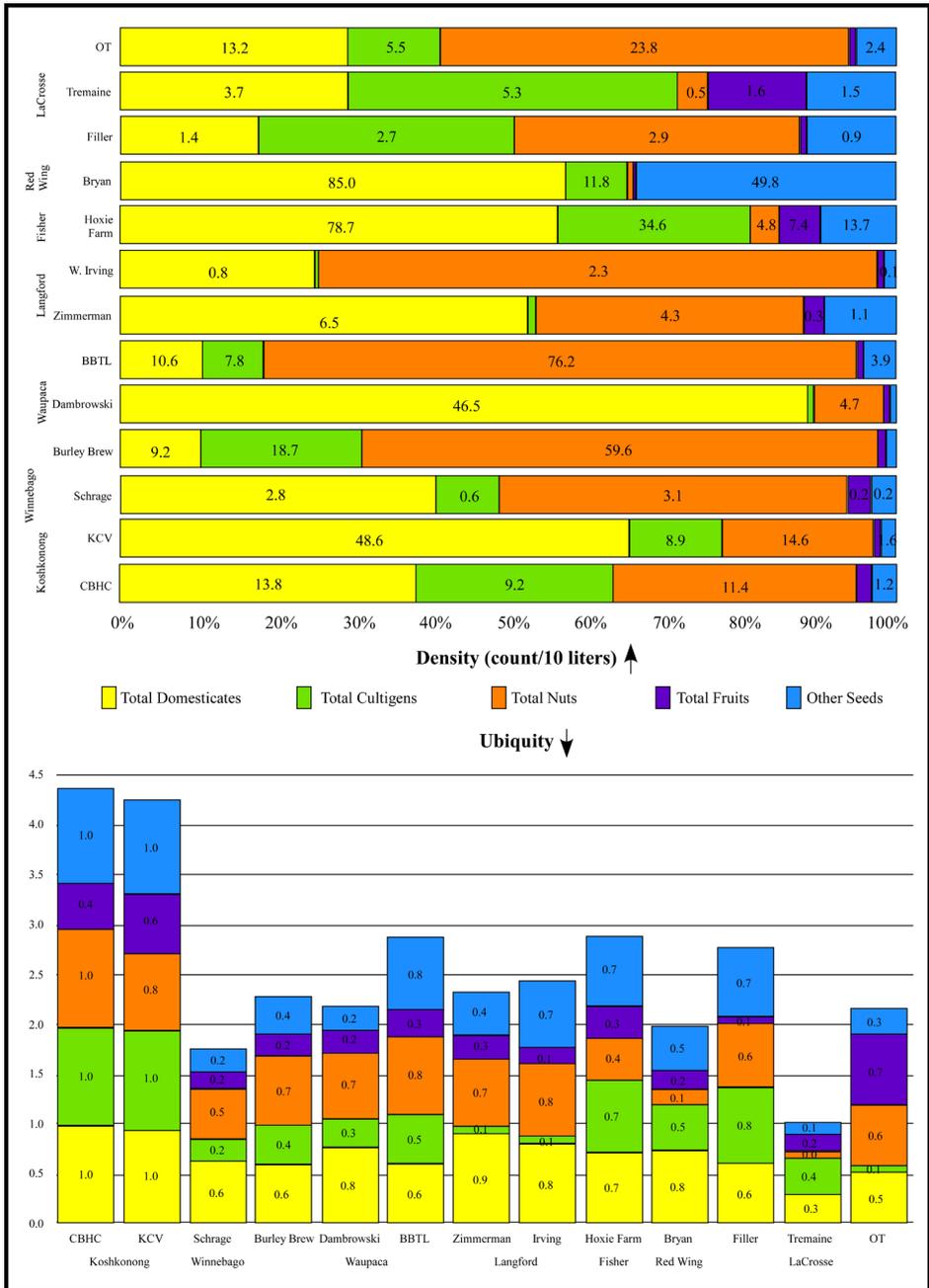
After taking taphonomic considerations into account (e.g., Fuellr et al. 2014; Gallagher 2014; Popper 1988; Toll 1988), agricultural resources stand out as the core of the plant portion of diets. Maize, a tropical domesticate, appears to have provided the most sizable portion of the diet. Squash, beans, and chenopodium



**FIGURE 4.2.** Box plot of density (count per 10 liters of soil) values of top three resources versus all other food plant remains from KCV and CBHC. (Not all outliers are pictured.)

(including *Chenopodium berlandieri*, see Olsen 2003) are also domesticated resources and contributed modestly to the diet. While not domesticated, wild rice is generally considered a cultigen (sensu Asch and Asch Sidell 1982) and was cultivated historically (Jenks 1901; Vennum 1988). Given the high densities and ubiquities of wild rice in the Koshkonong Locality, some degree of cultivation is probable (see Edwards 2017:214–215). The remaining floral resources at the sites include nutshell and small amounts of berries, EAC cultigens (*Echinochloa* sp., *Helianthus annuus*, *Hordeum pusillum*, *Phalaris caroliniana*, *Polygonum erectum*), and other seeds. With the exception of walnut and acorn, all the economically significant resources were cultivated.

Iterations of the Koshkonong pattern are visible throughout the region. The comparative data set shows contemporaneous Upper Mississippian village assemblages are consistently dominated by maize, cultivated plants, and nuts (Figure 4.3). However, the proportional importance and types of cultigens and nuts vary among localities. For example, the La Crosse sample has lower maize values but higher cultigen densities. *Chenopodium* and little barley are particularly well represented in the sample, and hickory, not acorn, accounts for the bulk of the nutshell. The Langford sample has high levels of maize and nutshell, but cultigens are notably absent. As with Koshkonong, acorn is the most common type of nutshell in the Langford sample. When all the regional samples are compared, maize is the single unifying resource. In each locality, people consumed unique suites of foods that supplemented maize harvests. These supplemental foods were generally found in the local diets prior to the adoption of maize-focused agriculture (see Egan-Bruhy 2014). By maintaining aspects of traditional diets, subsistence was diversified, resulting in a buffer for years when maize harvests were insufficient. In most cases,



**FIGURE 4.3.** *Top:* Distribution of density (count/10 liters) scores across sites and localities. *Bottom:* Distribution of ubiquity scores across sites and localities.

the bulk of these resources was cultivated and/or naturally aggregated—and had been for centuries.

### ***Isotope Results***

While the macrobotanical data can identify which resources are important, taphonomic considerations make it impossible to quantify the relative significance of the taxa beyond basic ordinal comparisons as presented above (Fuller et al. 2014; Gallagher 2014; Pearsall 1988, 2010; Popper 1988). However, isotopic data can provide a degree of quantification. The isotopic data in this analysis indicate that there was variation among localities and between archaeological cultures (Table 4.2). Among Upper Mississippian groups, the 95% confidence interval of the combined human and dog  $\delta^{13}\text{C}$  values range between  $-11.4\text{‰}$  and  $-13.7\text{‰}$ . Isotopes taken from bone collagen do not reflect the importance of maize in the overall diet. Rather, the values are mostly associated with the proportion of protein provided by maize, which can be approximated with the following equation (Ambrose et al. 2003; Ambrose and Norr 1993).

$$\%C_4 \text{ of protein consumption} = \frac{-25\text{‰} (\delta^{13}\text{C collagen} - 5.1\text{‰})}{15}$$

The sampled Upper Mississippian  $\delta^{13}\text{C}$  values equate to 41%–56% of the diet's protein. Based on these samples, individuals in Koshkonong and Langford groups consumed the most maize, accounting for roughly half their protein; whereas for western groups, maize only accounted for roughly 40% of protein intake. In either case, maize was clearly a highly significant resource—especially given its low protein content. For  $\delta^{15}\text{N}$ , the 95% confidence interval ranges between 8.4‰ and 10.5‰. The  $\delta^{15}\text{N}$  values mark a significant decrease in meat consumption from earlier time periods (e.g., Edwards et al. 2017; Romond et al. 2011; Wellner 2006). As cultivated plants became more significant, the role of meat decreased, although it still remained important.

The question of overall dietary importance of agricultural resources remains. While the isotopes alone cannot answer this question, the combination of paleobotanical data, isotope values, and modern nutritional information can be used to create multiple models of Upper Mississippian subsistence. The macrobotanical and zooarchaeological data can identify the most important resources used in a locality. The nutritional data (U.S. Department of Agriculture, Agriculture Research Service 2017) provides the protein and caloric contributions of each resource, and the isotope values indicate how much protein was derived from maize. Several models can be generated that match the protein contribution of maize by adjusting the levels of each resource in the diet. Once all the possible models have been generated, we can project the potential caloric contributions of each resource.

I generated several models using the Koshkonong data that included maize, wild rice, chenopodium, and acorn, which were the most commonly identified plants in the assemblage. I also included deer to represent large mammal and walleye to

TABLE 4.2.  
DESCRIPTIVE STATISTICS FOR  $\delta^{13}\text{C}$  AND  $\delta^{15}\text{N}$  VALUES OF DOGS AND HUMANS  
FROM UPPER MISSISSIPPIAN SITES.

Region	<i>n</i>	$\delta^{13}\text{C}$ (‰)					% Maize as Protein in Diet					
		$\mu$	$\sigma$	Min	Max	95% Confidence Interval	$\mu$	Min	Max	95% Confidence Interval		
Koshkonong	2	-12.70	1.41	-13.70	-11.70	-15.53	-9.87	48.00	41.33	54.67	29.14	66.86
La Crosse	8	-14.18	1.43	-16.40	-11.60	-17.04	-11.31	38.17	23.33	55.33	19.09	57.25
Red Wing	7	-13.63	1.52	-16.70	-12.10	-16.67	-10.59	41.81	21.33	52.00	21.56	62.06
Upper Illinois	62	-12.26	0.69	-14.70	-9.80	-13.64	-10.88	50.91	34.67	67.33	41.71	60.11

Region	<i>n</i>	$\delta^{15}\text{N}$ (‰)					
		$\mu$	$\sigma$	Min	Max	95% Confidence Interval	
Koshkonong	2	9.1	0.6	8.1	9.0	7.8	10.3
La Crosse	8	9.5	0.4	8.4	9.5	8.7	10.3
Red Wing	7	9.4	0.6	8.4	10.0	8.2	10.6
Upper Illinois	61	9.7	0.7	8.4	10.7	8.4	11.0

Includes data from Edwards (2017), Emerson and colleagues (2010), and Pratt (1994).

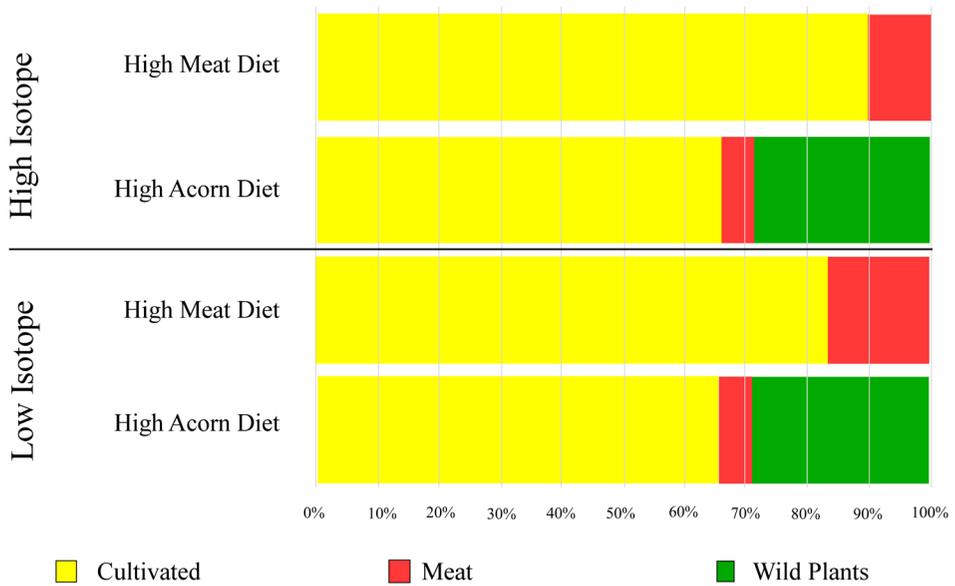
represent fish, which were the most prevalent categories of animal remains (see McTavish, this volume). Using the two CBHC isotope values of 41% and 55% protein as bounds for maize consumption, each resource value was adjusted for the various models while maintaining an arbitrary 2,000-kilocalorie diet. The specific number of calories is not as important as the proportional significance of each resource. The two extremes are the high-meat and high-acorn diets. When meat values are elevated to 200–300 g per day, maize levels peak at 71%–81% of total calories. When acorn levels are elevated to 150 g per day, maize contributions are at their lowest: 38%–59% of total caloric intake. For most models, maize contributes more than 50% of total calories (Table 4.3). These middle models are likely a better indicator of the typical diet in the region. Each resource would have varied seasonally, annually, and among individuals, but the isotope values represent long-term averages, where shortages and surpluses of a given resource would negate each other (Ambrose 1987; Ambrose and DeNiro 1986; Guiry 2012, 2013). With this in mind, we can conservatively say maize provided 50% or more of the calories in the typical Koshkonong diet.

## Discussion

When the caloric contributions of other cultivated resources are added, most models suggest agricultural resources provided between 70% and 80% of calories (Figure 4.4). Using 75% as a rough estimate, it is clear that agriculture provided the most significant contribution to the diets of people living in the Koshkonong Locality. Even if maize was slightly less important in other localities, the sampled Upper

TABLE 4.3.  
CALORIES (Kcal) AND PROTEIN (g) OF EACH RESOURCE WITHIN THE EXTREME MODELS  
(HIGHEST AND LOWEST MAIZE CONTRIBUTION).

	Maize		Wild Rice		Goosefoot		Acorn		Deer		Fish		Overall Diet	
	Kcal	Protein	Kcal	Protein	Kcal	Protein	Kcal	Protein	Kcal	Protein	Kcal	Protein	Kcal	Protein
High Meat Diet	Serving (100 g)	15.5	0.4	0.5	0.5	0.5	0.5	0.5	1.5	1.5	1.5	1.5	—	—
		1,333	50.7	132.5	5.5	21.5	2.1	193.5	3.1	180	34.4	139.5	28.7	2,000
High Acorn Diet	Serving (100 g)	8.75	1.5	0.5	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.5	—	—
		752.5	28.6	539	22.2	21.5	2.1	580.5	9.2	60	11.5	46.5	9.6	2,000
High Meat Diet	Serving (100 g)	18.9	0.4	0.5	0.5	0.5	0	0	1.0	1.0	1.0	1.0	—	—
		1,625.4	61.8	140.1	5.78	21.5	2.1	0	0	120	23.0	93	19.1	2,000
High Isotope (5% of Protein)	Serving (100 g)	13.7	0.3	0.5	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.5	—	—
		1,178.2	44.799	113.3	4.7	21.5	2.1	580.5	9.2	60	11.5	46.5	9.6	2,000
		59%	55%	6%	6%	1%	29%	11%	3%	14%	2%	12%	100%	100%

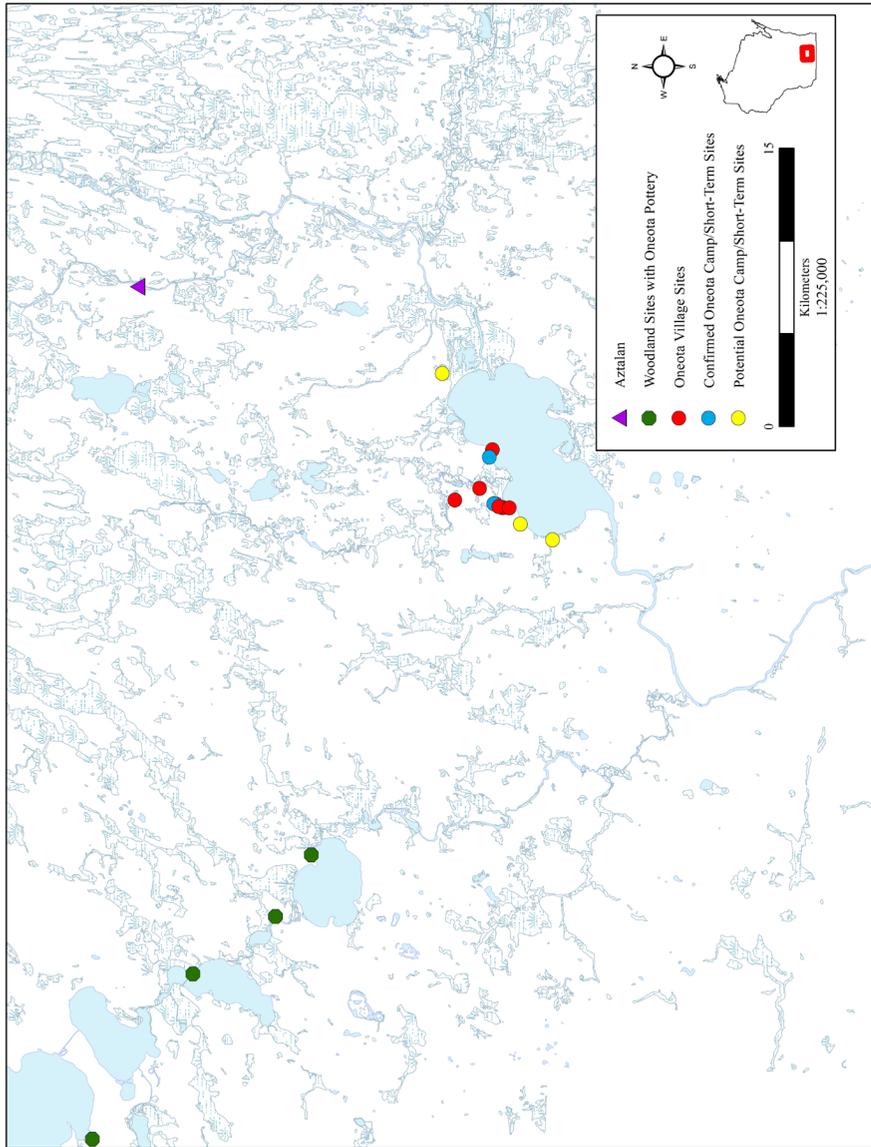


**FIGURE 4.4.** Select dietary models based on isotope values, macrobotanical data, and nutritional values of resources.

Mississippian economies may at least be characterized as agricultural and focused. These labels have significant implications for interpreting many aspects of Oneota social dynamics—from local gender politics to large-scale intergroup relations; however, it is essential to situate such interpretations in the immediate social and physical environment of each locality.

To understand how agriculture is embedded in the subsistence systems of the Koshkonong Locality, it is necessary to understand the relationship of each site to the other sites across the landscape, including sites that clearly represent different cultural traditions. An examination of the settlement data highlights the aggregation and isolation of Oneota sites in the region (Figure 4.5). There are remarkably few Oneota sites around Lake Koshkonong, which is particularly noteworthy given the intensity and duration of occupation of the major village sites (see Jeske et al., this volume). Furthermore, the bulk of the sites in the region are concentrated in a small area along the northwest shore of the lake. A few sites with reported Oneota ceramics are located outside the immediate area of Lake Koshkonong. However, these reported sites have few shell-tempered sherds and their relationship to the sites in the Koshkonong Locality is tenuous. This pattern suggests (a) that sites outside the core area are short-term and ephemeral; (b) that most activities took place within close proximity to the villages; and (c) that trips requiring a prolonged stay outside the village were few and far between (see also Jeske, this volume). In non-violent landscapes, we would expect to see sites distributed across a wider range, allowing people to access the full extent of resources available. This restricted pattern suggests that people were not willing to venture far from their core territory.

Relative to Upper Mississippian settlement systems in other regions, the Koshkonong Locality is atypical (Jeske 1990; Overstreet 1978; Rodell 1983; Sasso 1989). For example, in the La Crosse Locality, there are several recognized site types,

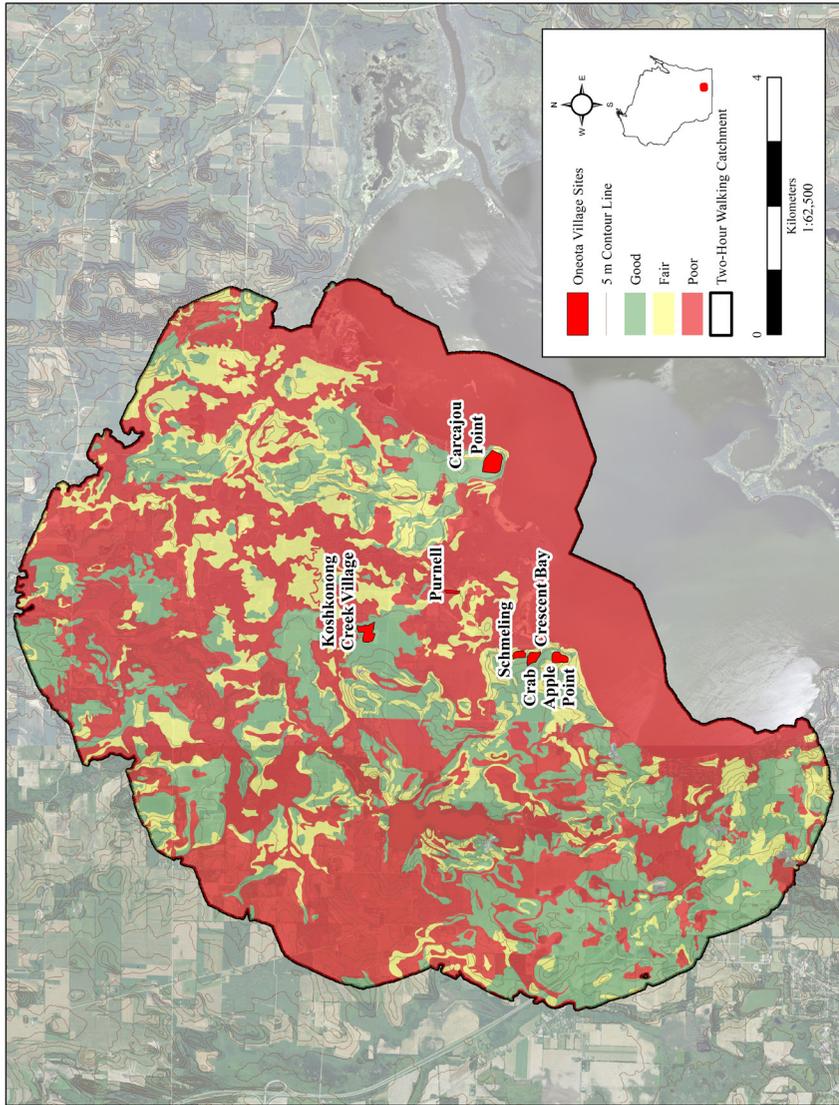


**FIGURE 4-5.** Physical relationship of Koshkonong Oneota sites to each other and their contemporaneous non-Oneota neighbors.

including defensive sites, villages, farmsteads, and numerous extractive camps. The pattern in La Crosse distributes the population across a large area where inhabitants could maximize access to available resources. Furthermore, there is ample evidence that villages were seasonally relocated in the winter, potentially dispersing the population farther (Sasso 1989). In Illinois, many of the Langford and Fisher sites were also seasonally occupied, and there are several examples of special-purpose campsites (Jeske 1990). In the area around Lake Winnebago, there are numerous special-purpose campsites, and sites are scattered throughout the region (Egan-Bruhy 2001b; Overstreet 1978). In Koshkonong, each village appears to have been occupied year-around; the majority of special-purpose sites are concentrated not just near villages but between them; and the number of sites away from the villages are few.

When the subsistence and settlement data are analyzed together and interpreted through a risk-management framework, we can begin to fathom the significance of these patterns. Together, the data sets indicate that there was an emphasis on locally available resources that were not only aggregated but also whose yields could be easily manipulated by human intervention. People rarely left the villages, so they needed to rely on resources that were locally available. Overreliance on deer would have been, at best, a short-term solution as animal populations would have become depleted with heavy exploitation. Even fish would lose productivity if people increasingly relied on it in the face of declining deer populations. Wild resources capable of feeding everyone in the six villages were few—likely limited to nuts and wild rice. Both of these resources exhibit variability in interannual yields (Arzigian 2000; Gardner 1997; Vennum 1988). Furthermore, as trees were cut down for firewood and building materials, the potential nut yield near the sites would have decreased. For example, oak is a common component of wood charcoal identified at CBHC (Egan-Bruhy 2001a), indicating that even nut-bearing trees were being used as firewood. Agricultural plants would have been the only real option to feed relatively large and sedentary populations.

The scenario described is supported by available subsistence data. Based on a number of evidential lines, agricultural resources were the most significant resource used at the locality. The density, ubiquity values, and  $\delta^{13}\text{C}$  values are consistent with significant agricultural intensification. These data are supported by the number and size of the pit features (Carpiaux 2018; Edwards 2017; Moss 2010), which correspond well with storage as a risk-management strategy. The aggregated nut and wild-rice resources were still important, but all data suggest that nonaggregated foods were economically unimportant to the Koshkonong inhabitants. The sites were ideally placed to maximize this strategy; not only was each village located on a large tract of arable land (Edwards 2010), but also each was situated in such a way that a large portion of the locally available arable land was between the sites (Figure 4.6). This area also provides access to a variety of soil drainages and elevations, which can reduce the risk of harvest failure if each area is planted every year (i.e., spatial diversification). The impact was likely magnified by growing multiple varieties of maize (Edwards 2017; Picard 2013), as well as several different domesticates (see also Olsen 2003). Further evidence of agricultural diversification is the inclusion of wild rice, which would allow the lake environment, normally agriculturally unproductive, to provide substantial resources to the diet. The lake, in essence, became the equivalent of arable land.



**FIGURE 4.6.** Oneota village site locations relative to modeled prehistoric agricultural potential, based on soil data (Soil Survey Staff 2017), vegetation, and elevation (see Edwards 2010). Aerial image from Wisconsin View (2017).

Overall, the Koshkonong settlement-subsistence system is consistent with several different risk-management strategies—namely, storage, raiding (*sensu* Halstead and O’Shea 1989), agricultural intensification, and agricultural diversification (*sensu* Marston 2011). These strategies allowed for residents to feed the population while remaining close to home. So, the next question we must tackle is, why did the inhabitants of the Koshkonong Locality feel the need to do this? Why did they not utilize mobility as a risk-management strategy? If maize harvests were poor, the residents could have moved to an area with more resources. However, moving was apparently not a regularly feasible option, at least in the short term. If it had been, the distribution of sites would look significantly different. The ceramic and lithic data also support this inference. Nonlocal ceramics are rare and, essentially, statistical anomalies. The ceramic motifs, recipes, and surface treatments all suggest that the ceramics were a locally oriented craft—designed in such a way as to emphasize a shared understanding of a localized identity (see Schneider and Carpioux, this volume). The bulk of the lithic raw material was locally procured, despite the rarity of quality outcrops nearby (see Sterner, this volume). And all other material classes show little evidence of substantial interaction with neighbors (see also Edwards and Jeske 2015). In fact, despite their proximity and contemporaneity, not a single artifact suggests trade between Aztalan and Koshkonong Oneota sites. However, contexts containing both Oneota and Late Woodland ceramics in the region suggest some interaction between these different cultural traditions, though the nature and duration of the interaction is unclear (e.g., Haas et al. 2017).

The Oneota settlement and subsistence data are most consistent with an attempt to minimize the impact of violent encounters (*sensu* Emerson 1999; Hart 1993). The Koshkonong pattern of intensifying agricultural resources allowed people to conduct much of their daily labors in larger groups while avoiding starvation and remaining near the relative safety of villages.

In a low-population and highly productive environment without social constraints on settlement, we would expect a more extensive use of the landscape (Binford 1980; Jochim 1981; Netting 1986). Concentrating occupation increases the risk of catastrophic crop failure through drought, flood, storm damage, or other natural phenomena (Goland 1993; Marston 2011; O’Shea 1989). At the Koshkonong Locality, dental data indicate that the reliance on agriculture was not just risky but at times also costly. Periodic malnutrition is evidenced by moderate to severe enamel hypoplasias on human teeth from several sites (see Foley Winkler 2011; Foley Winkler and Jeske 2003). In addition, a high percentage of human skeletal remains show evidence of unhealed wounds from arrows, knives, and clubs (Jeske 2014; Jeske and Sterner-Miller 2014).

Historically, agriculture was in the women’s domain (Doolittle 2000; Hurt 1987), so emphasizing cultivated crops could also free up male labor for defense and offense (e.g., Snow 2007). The skeletal data suggest that such concerns were legitimate (Jeske 2014). Additionally, the placement of the sites not only helped with agricultural intensification, but it also helped defensively (e.g., McTavish 2016, 2019). Each village was placed on high ground, overlooking difficult terrain or water. Together, the sites created a network of lookout posts and safe havens. Each of these areas was easily accessed from the other but not from the outside. The

result is that any major attack force could be spotted at a distance, noncombatants could be evacuated, and reinforcements could be called. Furthermore, the amount of arable land between the sites was more than sufficient to feed even the largest estimated population for the Koshkonong Locality. We cannot demonstrate that the agricultural fields were placed among the village sites. However, such a placement would be consistent with the pattern in the Middle Fox Locality, where agricultural sites are, on average, less than 0.8 km from Oneota village sites (Sasso 2001). If maize accounted for 70% of the diet, then the area within a two-hour walk from the Koshkonong villages could feed roughly 15,000 people (630 kg/ha maize, approximately 3,000 hectares, and 760 kg/family of 5—based on estimates from Schroeder 1999). Even if three years of food were stored as a safety net (O’Shea 1989), then 5,000 people is still far larger than any population estimates for the region (see Jeske, this volume; Sterner 2018). By concentrating fields near villages, both people and crops were made safer.

However, such a system would necessitate a close-knit community: one where people could rely on others from different villages to help with defense and, likely, planting, harvests, and other essential tasks. Halstead and O’Shea (1989) suggest that such networks require active maintenance, particularly when there are prolonged periods where violence is uncommon. Failure to maintain trust among the sites’ residents could result in a fracturing of the whole system. The shared ceramic styles among the site locations are a good indicator that the residents of each site saw one another, at some level, as members of a single group. There are also indications that some ceramic vessels moved between sites (Schneider 2015) and that feasting activities took place (Carpiaux 2018). Halstead and O’Shea (1989) argue that such meals are often mechanisms to normalize and even ritualize costly risk-buffering behaviors. If these feasts included visitors from different sites, then they likely functioned to maintain intralocality cohesion.

A reduced male role in everyday subsistence activity and an increased role in warfare, as well as a simultaneous increase in women’s subsistence roles, likely influenced the mechanisms for obtaining social capital for both men and women. Snow (2007) argues that, under similar circumstances, success in warfare became the primary form of social capital for men in Iroquoian societies. Historic and ethnographic descriptions of many midwestern groups, such as the Ho Chunk (e.g., Radin 1923), suggest that warfare was an important part of men’s identities. While there is usually less information about women’s roles in pre-nineteenth-century societies, these gendered labor shifts almost certainly changed the ways that status was measured both between and among men and women in the Koshkonong Locality (see also Benn 1989).

## Conclusion and Summary

More than 30 years ago, in an attempt to better understand the cultural dynamics of the groups under study, archaeologists began substantial investigations into the nature of the Oneota subsistence systems. At the time, there was insufficient data to as-

sess the issue with any real clarity. However, the data collected over the past decades are now sufficiently robust. It can be said with confidence that Upper Mississippian groups, or at least those discussed here, relied on a focused agricultural diet.

Furthermore, the data indicate that in the Koshkonong Locality, people were relatively isolated geographically, socially, economically, and politically. When viewed through a risk-management perspective, it appears that the settlement-subsistence system was geared toward violence mitigation, with a defensive posture. In the Koshkonong Locality, the population remained constrained, but in an area with highly productive agricultural land and access to lake and riverine resources. However, highly productive and arable land surrounds the lake, yet the residents of the Koshkonong Locality did not make use of this highly productive land except for the northwest shore. However, Late Woodland sites can be found on arable land around the entire lake (see Jeske, this volume). The pattern of Oneota constriction into small territories is seen throughout northern Illinois and southern Wisconsin (Emerson 1999; Jeske 2003b; Richards and Jeske 2002). The risk of violent encounter permeated almost every aspect of daily routines. From this, we can infer a great deal about the interaction between the sites' inhabitants. First, they needed to work cooperatively. Second, this cooperation was only sustainable through institutionalized network maintenance, such as holding regular feasts, endorsing intermarriages, and the like. Third, such an economic shift would affect the means that men and women obtained status, both individually and as a group. It is unclear to what degree this pattern extends to other Upper Mississippian localities. It is essential that all such analyses be grounded in the locality's environmental and political situation. Only then can such inferences be made.

## Acknowledgments

I would like to thank the landowners of KCV and the Crescent Bay Hunt Club for their cooperation, patience, and permission to dig up their properties. I also need to thank the National Science Foundation (Grant #1640364) and the UW-M Department of Anthropology Preliminary Dissertation Grant for funding the isotopic research. I would also like to thank Joan Coltrain of the University of Utah for assistance with the isotopes; the Wisconsin Historical Society, particularly Angela Glasker and Scott Roller; UW-Lacrosse, particularly Connie Arzigian and Jim Theler; and the Milwaukee Public Museum, particularly Dawn Scher-Thomae and Claudia Jacobson for access to the dog remains for the isotopic analysis.

## Funding Details

This research was funded by a National Science Foundation Dissertation Improvement Grant (#1640364) and the University of Wisconsin-Milwaukee Department of Anthropology Preliminary Dissertation Research Award.

## Note on Contributor

### *Richard W. Edwards*

ORCID: 0000-0001-5421-1020; @re\_1984 (Instagram); and @RickArchaeology (Facebook) — Edwards is currently a principal investigator at Commonwealth Heritage Group and an honorary fellow at the University of Wisconsin–Milwaukee. He earned his PhD from UW–Milwaukee in 2017. He specializes in paleoethnobotany and GIS. His research interests include subsistence/settlement studies, landscape and environmental archaeology, risk management, ethnogenesis, and the relationship between humans and dogs.

## 5

# Archaeofauna as Evidence for a Specialized Oneota Economy

Rachel C. McTavish

*ESCA TECH INCORPORATED, MILWAUKEE*

Intralocality subsistence economics are often underinvestigated or glossed over due to the generalization that villages within the same locality, if not seasonally or temporally distinct, are relatively uniform. Archaeofaunal evidence from two villages in the Koshkonong Locality indicates that the site residents of the Crescent Bay Hunt Club (47JE904) and Koshkonong Creek Village (47JE402) engaged in a modified version of “complex specialized economics” (O’Shea 1989:80). Data indicate that the residents of these villages worked to facilitate a locality-wide economic system that would have allowed groups to focus on immediately available resources that could be exchanged with members from different sites. Residents focused on different aspects of resource acquisition, which allowed a combined nuanced relationship between villages to be established. The complementary systemic relations support the notion of a shared but distinctive identity between the sites within this locality.

**KEYWORDS** Zooarchaeology; Oneota Village; Prehistoric Economics; Archaeological Identity

## Introduction

This article uses a modified version of “complex specialized economics” (O’Shea 1989:60) to investigate the nuances of subsistence acquisition and exchange patterns within Oneota groups in the Koshkonong Locality. There is evidence for increased aggregation of distinct cultural groups on the landscape during the eleventh through fifteenth centuries in the western Great Lakes and northern Prairie Peninsula. As groups began to rely more heavily on agriculture, they were increasingly tethered to a particular area of the landscape (Hart 1990, 1993; Marston 2011). Investment

in these fields and the associated villages became more critical as groups became increasingly territorial and circumscribed on the landscape (see Layton and Ucko 2003; Zedeño 1997; Zedeño et al. 1997). The degree to which this increasing territoriality and circumscription manifests archaeologically in subsistence strategies—specifically the use of vertebrate animals—for Wisconsin Oneota groups is discussed using the Crescent Bay Hunt Club (47JE904; CBHC) and Koshkonong Creek Village (47JE379; KCV) to assess overall site resource acquisition and exploitation strategies based on the immediate ecology.

### Framing a Nuanced Approach to IntraLocality Economics

O’Shea (1989) built a framework for investigating the way in which two distinct groups interact within a risk-management environment. In his model of “complex specialized systems,” each of the distinct groups of actors plays a specific role within an interrelated economic framework (O’Shea 1989:60). One example he used to illustrate his model is the trade interaction between the Huron and the Algonquin.

O’Shea (1989) set up his complex specialized system where two distinct groups with different identities maintain a symbiotic economic relationship. His model serves as a heuristic framework for researching village-based identity by investigating daily economic relationships within and between villages. O’Shea illustrates his model with several examples, including the trade relations of the seventeenth-century Huron (Huron-Wendat).

The Huron were maize agriculturalists who, by the time of European contact, had largely depopulated their own territory of deer and other fur-bearing mammals. They regularly traded for deer, and occasionally tobacco, with the Neutrals to the south. However, in years of bad agricultural productivity, they also traded for maize (O’Shea 1989:65). O’Shea argues the Huron-Neutral-type trade served as an economic buffering activity that we might expect most groups to undertake with neighbors. O’Shea also describes a qualitatively different type of trade that the Huron undertook with the Algonquin. The Algonquin generally lived in areas where maize agriculture was impractical, and they focused on trapping, hunting, and gathering. Agricultural foods and European trade goods were exchanged by the Huron with small Algonquin bands of hunters, primarily for furs and meat. However, O’Shea argues that the Huron-Algonquin trade differed from Huron-Neutral trade in that the Huron grew agricultural surpluses specifically for trade with the Algonquins. In turn, the Algonquin bands produced surpluses in meat and furs specifically to trade with the Huron:

The system that developed among the Huron and the Algonquins fits a complex/specialised model. Both the Huron and the Algonquins effectively specialised in their own subsistence activities. This is not to say that there was no overlap—several of the more southerly Algonquin groups did maintain small maize fields, while the Huron themselves were active fish harvesters—but this does not lessen the effective specialisation that had developed. Both societies regularly *overproduced* in anticipation of exchange. The regularity of this overproduction played

an important role in the risk-buffering value of the system, not simply by ensuring that excess food was on hand, but in providing momentum for the continuation of trade, even in those years when one side had little or no food to exchange [O'Shea 1989:65, emphasis in original].

We need not propose a simple economic determinism for the Huron-Algonquin exchange network of meat, pelts, and agricultural produce to recognize the heuristic utility of O'Shea's complex-economic-system model of specialization and exchange. Both the Huron and Algonquin (like most Great Lakes tribes) engaged actively in the fur trade in a complex network of external relationships, competing for access to European trade goods, obtaining the best prices for their commodities, and defending their resource territories (see Fitting 1972; Innis 1930; McManus 1972; Smith 1973). Individuals also engaged in intragroup status, gender, political, subsistence, and kin networks for their own purposes—some related to economics, some to other influences (Nassaney 2015; Speck and Eisley 1939; Trelease 1962; White 1999). Whether the Huron-Algonquin exchange relationship was a mainstay or a supplement to their economies during the seventeenth through eighteenth centuries is not important for this analysis. O'Shea's framework may still be useful for interpreting particular patterns when comparing possible economic relationships within and between Koshkonong Locality Oneota sites.

In this analysis, CBHC and KCV are compared as distinct contemporary residential populations based on their different ecological settings within the larger Koshkonong Locality. These villages are separated on the landscape, but their occupants likely interacted on a regular basis (Carpiaux 2018; also see Schneider and Carpiaux, this volume; Sterner, this volume). KCV yields more large feasting vessels compared with CBHC, suggesting that residents from sites immediately along the lakeshore may have been traveling to KCV for communal events. Further, Edwards (2017) makes a case for different agricultural pursuits based on proximity to more upland arable land and aquatic niches. Building on their research and using O'Shea's (1989) framework, this article examines whether the zooarchaeological data support a difference in site resource and potential microidentity within the locality.

Oneota localities are defined based on geographic proximity of village sites and a shared materialization of identity, such as ceramic motifs and technological organization (Overstreet 1978, 2000). However, a focused investigation of individual village subsistence economic patterns can reveal more detailed levels of group identity within the larger identity as neighbors. Essentially, this line of inquiry investigates the internal variation in economics and identity between neighboring groups who were outwardly identifying as members of the same group.

## Methods

The Koshkonong Oneota village sites used in this research were excavated by UWM field schools between 1998 and 2017 (see Jeske et al., this volume). Faunal specimens were identified using the University of Wisconsin–Milwaukee zooarchaeological skeletal comparative collection and comparative skeletons on loan from the Univer-

sity of Wisconsin–Madison Zoology Museum. Both sets of comparative skeletons are currently housed in the UW–Milwaukee Archaeological Research Laboratory. Osteological guides were used as supplementary resources for identifications (e.g., Gilbert 1990; Gilbert et al. 1996; Hillson 1986; Olsen 1968, 1979).

Each specimen was sorted based on provenience and taxonomic class and weighed to the nearest hundredth gram. Counts were quantified as the number of specimens present, or NSP, while specimens identified to class, family, genus, or species were quantified as the number of identified specimens (NISP; see Grayson 1984; Lyman 1994, 2008). Elements were recorded and used in determining family, genus, and species identifications. Specimens unable to be identified were labeled as unidentified (UNID). When possible, mammals that could not be identified to a taxonomic family or species were sorted into distinct size categories for comparative purposes (Table 5.1). Size categories were based on the following criteria whenever possible: element fragment length and diameter (e.g., shaft) in comparison to osteological comparative skeletons and cortical thickness of fragments. A size category X was used for mammal specimens not able to be identified to a size category.

Minimum number of elements (MNE) values were used to quantify the lowest value of possible discrete body parts of an animal at a site. The MNE value was calculated using identified elements of each taxon. For this analysis, age, robusticity/size, anatomical overlap, and modification were included.

Biomass was calculated using allometric methods from Reitz and colleagues (1987). For this analysis, biomass was calculated using bone weights from animals in an entire feature. This approach aggregates screened and flotation materials. Horn, antler, and fish scales were excluded from biomass calculations.

To differentiate local from nonlocal animal acquisition patterns, ecological niches and specific animals were used to test for nuances in exploitation patterning. Proximity cutoffs between local and nonlocal relied on a 2 km circular catchment model generated by Edwards (2010; summary data in Table 5.2).

*Forest* was used as a model category but was not represented in any of the 2 km catchments surrounding the site areas. Therefore, animals favoring forest habitats represent animals what would have necessitated coordinated hunting ventures or were kills farther from the immediate site area. As such, these animals represent one end of the spectrum—animals that were hunted where distance to and from resource acquisition was not a limiting factor.

Savanna soils are the most arable in the site areas (see Edwards 2010). As such, these patches represent areas where agricultural fields and gardens were most likely placed. Forests and field edges represent the opposite end of the spectrum of

TABLE 5.1.

## MAMMAL SIZE CATEGORIES.

Size	Category	Example Fauna	Live Weight Ranges
Small	I	Mice ( <i>Mus musculus</i> ), Squirrel ( <i>Sciurus spp.</i> )	<99–699 g
Medium	II	Muskrat ( <i>Ondatra zibethicus</i> )	700 g–19 kg
	III	Dog ( <i>Canis familiaris</i> )	20–39 kg
Large	IV	White-Tailed Deer ( <i>Odocoileus virginianus</i> )	>40 kg
Unknown	X	Unsize Mammal Fragment	—

TABLE 5.2.

## 2 KM VILLAGE CATCHMENT SUMMARY DATA.

Sites	Ecological Zones from 2 km Circular Catchments				
	Savanna	Prairie	Wetland	Lake/River	Creek
CBHC	60%	11%	5%	22%	1%
KCV	84%	2%	12%	0%	2%

After Edwards (2010).

ecological resources, as they were close to the villages and were likely the site of opportunistic kills (i.e., animals trapped by gardens and fields or hunted as pests). Wetland, lake/river, and creek represent a combined water-edge category. By keeping water- and field-edge niches separate, the effect of proximity to the lake on resource acquisition is considered.

These environmental niches were compared with the biomass proportions of animals that are habitually known to favor these environments. The following animals were used to compare habitat niche exploitation at the village sites:

- Forest: bear, elk, fox
- Field edge: raccoon, turkey, rabbit
- Water edge: waterfowl, fish, muskrat, otter, fisher, beaver

Deer are excluded from this comparison, since they can be hunted along field edges and in forests. Two themes for investigating deer-hunting strategies within each site assemblage were used: local versus nonlocal hunting and age-selective versus nonselective hunting. In a basic hunting scenario, one would expect hunters to be engaging in coordinated hunting pursuits and targeting prime-age deer (ages 2.5–5 years).

Local and nonlocal deer hunting was addressed by comparing proportions of MNE values for body parts in the following categories: cranial, axial, upper limb, and lower limb. A rough skeletal index was used to determine if hunting was more likely local or nonlocal. A ratio of expected proportions of cranial to upper-limb elements was compared with the MNE data per site assemblage (e.g., 1 cranial element to every 2 upper-limb elements). Binford (1977) indicated that evidence of local hunting should result in more noneconomically productive elements present within the general village area since carcasses would be processed locally and larger body-part transfer would be easier. This pattern is opposed to coordinated hunting trips, where larger meat packages would be brought back to the habitation area in greater quantities than would nonmeat bearing elements.

## Results

Overall, the Koshkonong Oneota faunal results indicate a discrete signature for each site. These differences in faunal signatures show a distinction between the immediately local ecological resources for each village. The large sample sizes for

these faunal assemblages represent a baseline for future subsistence research for this locality and can help frame expectations for eastern Wisconsin as a whole.

### ***Crescent Bay Hunt Club***

A total of 50,652 vertebrate specimens, weighing 65 kg, were recovered from 13 features at CBHC (Table 5.3). The calculated biomass shows that, among the vertebrate resources, there is a clear distinction between fish and mammal resources, with a high emphasis on mammal protein consumption (Table 5.4). Further, the data show a high emphasis on large mammals (Class IV).

### **Species Summary Data: NISP, Bone Weight, Biomass**

Most mammals represented in the CBHC assemblage sample are Cervidae, many of which are white-tailed deer (Table 5.5). Deer bone makes up approximately 27% of NISP and 31% of biomass—46% if one includes all Cervidae. Raccoon, beaver,

TABLE 5.3.

CBHC CLASS SUMMARY DATA, NISP, AND BONE WEIGHT.

Identification	NISP	Proportion	Weight (g)	Proportion
Identified	39,428	77.84%	56,025	86.08%
UNID	11,224	22.16%	9,063	13.92%
TOTAL	50,652	100.00%	65,088	100.00%
Taxonomic Class	NISP	Proportion	Weight (g)	Proportion
Fish	12,379	31.40%	8,043.14	14.36%
Bird	1,203	3.05%	989.07	1.77%
Mammal	24,873	63.08%	45,992.71	82.09%
Reptile	952	2.41%	982.16	1.75%
Amphibian	21	0.05%	18.04	0.03%
TOTAL	39,428	100.00%	56,025	100.00%

TABLE 5.4.

CBHC VERTEBRATE TAXONOMIC CLASS  
BIOMASS SUMMARY DATA.

Taxa	Biomass (g)	Proportion
Mammal	52,280	78.59%
Birds	1,460	2.20%
Fish	11,570	17.39%
Reptile	1,210	1.82%
Undifferentiated Mammal Sizes		
Class I	114.94	0.34%
Class II	760.76	2.26%
Class III	1,159.88	3.45%
Class III/IV	430.3	1.28%
Class IV	12,597.89	37.47%
Class X	18,555.03	55.19%

TABLE 5.5.

## CBHC SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass (g)	Proportion
<b>MAMMALIA (Mammals)</b>						
Artiodactyla	26	0.20%	48.04	0.25%	80.62	0.29%
Cervidae	879	6.80%	2,804.91	14.75%	3,660.05	13.37%
<i>Bison bison</i> (bison)	3	0.02%	39.10	0.21%	64.57	0.24%
cf. <i>Bison bison</i> (bison)	1	0.01%	6.75	0.04%	12.46	0.05%
<i>Odocoileus virginianus</i> (deer)	2,786	21.55%	5,981.49	31.46%	7,284.46	26.60%
cf. <i>Odocoileus virginianus</i>	687	5.31%	935.37	4.92%	1,321.60	4.83%
<i>Cervus elaphus</i>	13	0.10%	66.48	0.35%	115.46	0.42%
cf. <i>Cervus elaphus</i>	8	0.06%	39.11	0.21%	67.48	0.25%
Carnivora	86	0.67%	76.39	0.40%	133.76	0.49%
<i>Ursus</i>						
<i>Ursus americanus</i> (American black bear)	6	0.05%	14.08	0.07%	25.42	0.09%
Canidae (dog, wolf)	88	0.68%	138.03	0.73%	230.38	0.84%
<i>Canis lupus familiaris</i> (domestic dog)	46	0.36%	92.11	0.48%	130.95	0.48%
<i>Vulpes</i>						
<i>Vulpes vulpes</i> (red fox)	47	0.36%	67.18	0.35%	110.49	0.40%
Procyonidae						
<i>Procyon lotor</i> (raccoon)	524	4.05%	829.04	4.36%	1,206.03	4.40%
Mustelidae (mustelids)	24	0.19%	32.16	0.17%	56.07	0.20%
<i>Lontra canadensis</i> (river otter)	26	0.20%	20.71	0.11%	36.90	0.13%
<i>Martes pennanti</i> (fisher)	3	0.02%	3.06	0.02%	6.11	0.02%
<i>Neovison vison</i> (American mink)	11	0.09%	5.19	0.03%	9.84	0.04%
<i>Taxidea taxus</i> (American badger)	48	0.37%	61.17	0.32%	105.36	0.38%
Mephitidae (skunks)						
<i>Mephitis mephitis</i> (striped skunk)	4	0.03%	3.62	0.02%	7.11	0.03%
Felinae (felines)						
<i>Lynx</i> (bobcats, lynx)	6	0.05%	6.77	0.04%	13.89	0.05%
<i>Lynx rufus</i> (bobcat)	4	0.03%	2.19	0.01%	4.52	0.02%
Didelphimorphia						
Didelphidae (opossums)						
<i>Didelphis virginianus</i> (North American opossum)	2	0.02%	1.98	0.01%	4.13	0.02%
Lagomorpha (hares, rabbits)						
Leporidae (cottontails)	12	0.09%	13.41	0.07%	26.17	0.10%
<i>Sylvilagus floridanus</i> (eastern cottontail)	363	2.81%	432.91	2.28%	673.84	2.46%
Rodentia	482	3.73%	482.95	2.54%	753.20	2.75%
Castoridae						
<i>Castor</i> (beavers)						
<i>Castor canadensis</i> (American beaver)	383	2.96%	513.85	2.70%	749.01	2.74%
Cricetidae						
<i>Ondatra</i> (muskrats)						
<i>Ondatra zibethicus</i> (common muskrat)	598	4.62%	627.62	3.30%	922.69	3.37%
Sciuridae (squirrel, chipmunk)	212	1.64%	182.16	0.96%	309.14	1.13%
<i>Sciurus</i> (tree squirrels)	269	2.08%	250.73	1.32%	405.7	1.48%
<i>Sciurus carolinensis</i> (gray squirrel)	18	0.14%	15.42	0.08%	29.71	0.11%
<i>Tamiasciurus hudsonicus</i> (red squirrel)	24	0.19%	19.07	0.10%	36.96	0.13%
<i>Tamias</i>	23	0.18%	12.46	0.07%	24.53	0.09%
<i>Tamias striatus</i> (eastern chipmunk)	36	0.28%	21.73	0.11%	43.77	0.16%
<b>TOTAL</b>	<b>7,748</b>	<b>59.92%</b>	<b>13,847.24</b>	<b>72.82%</b>	<b>18,662.38</b>	<b>68.15%</b>

(continued)

TABLE 5.5, CONTINUED.

## CBHC SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass (g)	Proportion
<b>AVES (Birds)</b>						
Anseriformes (duck, geese, swan, waterfowl)	18	0.14%	12.03	0.06%	20.26	0.07%
<i>Anatidae</i> (duck, geese, swan)	34	0.26%	49.71	0.26%	76.77	0.28%
<i>Anas</i> (dabbling ducks)	21	0.16%	35.19	0.19%	58.17	0.21%
<i>Anas platyrhynchos</i> (mallard)	214	1.66%	129.07	0.68%	186.98	0.68%
<i>Anas crecca</i> (green-winged teal)	3	0.02%	2.74	0.01%	4.85	0.02%
<i>Lophodytes</i> (hooded mergansers)						
<i>Lophodytes cucullatus</i> (hooded merganser)	1	0.01%	0.59	0.00%	1.20	0.00%
<i>Aix</i> (wood ducks)						
<i>Aix sponsa</i> (wood duck)	96	0.74%	84.05	0.44%	123.70	0.45%
<i>Aythya</i> (diving ducks)	2	0.02%	1.26	0.01%	2.39	0.01%
<i>Aythya affinis</i> (lesser scaup)	128	0.99%	71.05	0.37%	106.67	0.39%
<i>Branta</i> (brent geese)						
<i>Branta canadensis</i> (Canada goose)	98	0.76%	98.92	0.52%	137.19	0.50%
Gaviiformes (loons, huarts)						
<i>Gaviidae</i> (loons, divers)	2	0.02%	1.58	0.01%	2.94	0.01%
<i>Gavia immer</i> (common loon)	7	0.05%	6.55	0.03%	11.40	0.04%
Galliformes (fowls)						
<i>Phasianidae</i> (partridge, turkey, grouse)						
<i>Phasianinae</i> (pheasants)						
<i>Phasianus colchicus</i> (ring necked pheasant)	13	0.10%	12.74	0.07%	22.37	0.08%
<i>Bonasa</i> (ruffed grouse)						
<i>Bonasa umbellus</i> (ruffed grouse)	2	0.02%	0.85	0.00%	1.67	0.01%
<i>Meleagris</i> (turkeys)						
<i>Meleagris gallopavo</i> (wild turkey)	6	0.05%	9.43	0.05%	14.92	0.05%
Columbiformes (doves, pigeons)						
<i>Columbidae</i> (doves, pigeons)	36	0.28%	19.72	0.10%	32.68	0.12%
<i>Ectopistes</i> (passenger pigeons)						
<i>Ectopistes migratorius</i> (passenger pigeon)	18	0.14%	20.19	0.11%	33.64	0.12%
Passeriformes (perching birds)	31	0.24%	18.72	0.10%	27.85	0.10%
<i>Corvidae</i> (crows, jays, magpies)	4	0.03%	1.54	0.01%	2.87	0.01%
<i>Corvus</i> (crows)						
<i>Corvus brachyrhyncho</i> (American crow)	6	0.05%	5.19	0.03%	9.53	0.03%
<i>Cyanocitta</i> (blue jays)						
<i>Cyanocitta cristata</i> (blue jay)	2	0.02%	0.63	0.00%	1.27	0.00%
Turdidae						
<i>Turdus</i> (robins)						
<i>Turdus migratorius</i> (American robin)	3	0.02%	0.66	0.00%	1.33	0.00%
Emberizidae (finches, sparrows)	1	0.01%	0.08	0.00%	0.19	0.00%
<i>Melospiza</i> (song sparrows)						
<i>Melospiza melodia</i> (song sparrow)	1	0.01%	0.03	0.00%	0.08	0.00%
Fringillidae (grosbecks, finches)	1	0.01%	0.14	0.00%	0.32	0.00%
<i>Spinus</i>						
<i>Spinus tristis</i> (American goldfinch)	1	0.01%	0.12	0.00%	0.28	0.00%
Mimidae (mockingbirds, thrashers)	1	0.01%	0.88	0.00%	1.72	0.01%
<i>Mimus</i> (mockingbirds)						
<i>Mimus polyglottos</i> (northern mockingbird)	1	0.01%	1.06	0.01%	2.04	0.01%

TABLE 5.5, CONTINUED.

## CBHC SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass (g)	Proportion
<b>AVES (Birds)</b>						
Hirundinidae (swallows)	1	0.01%	0.83	0.00%	1.63	0.01%
<i>Progne</i>						
<i>Progne subis</i> (purple martin)	1	0.01%	0.99	0.01%	1.92	0.01%
Icteridae (blackbirds, orioles)	2	0.02%	1.43	0.01%	2.68	0.01%
<i>Agelaius</i> (red-winged blackbirds)						
<i>Agelaius phoeniceus</i> (red-winged blackbird)	2	0.02%	1.68	0.01%	3.11	0.01%
Suliformes (cormorants)						
<i>Phalacrocoracidae</i> (cormorants, shags)						
<i>Phalacrocorax</i> (cormorant)						
<i>Phalacrocorax auritus</i> (double-crested cormorant)	8	0.06%	13.26	0.07%	21.83	0.08%
Pelecaniformes (pelicans, herons)						
Ardeinae (herons, egrets)						
<i>Ardea</i> (great herons)						
<i>Ardea herodias</i> (great blue heron)	1	0.01%	3.06	0.02%	5.36	0.02%
Accipitriformes (hawks, eagles)	1	0.01%	1.14	0.01%	2.18	0.01%
<i>Accipitridae</i> (hawk, eagle)	43	0.33%	68.11	0.36%	90.21	0.33%
<i>Accipiter</i> (bird hawks)	1	0.01%	1.16	0.01%	2.22	0.01%
<i>Accipiter cooperii</i> (Cooper's hawk)	2	0.02%	3.42	0.02%	5.93	0.02%
<i>Buteo</i> (buteonine hawks)						
<i>Buteo jamaicensis</i> (red-tailed hawk)	2	0.02%	2.05	0.01%	3.72	0.01%
Stringiformes (owls)	14	0.11%	11.42	0.06%	20.34	0.07%
Stringidae (typical owls)						
<i>Bubo</i> (horned owls)						
<i>Bubo virginianus</i> (great horned owl)	6	0.05%	6.64	0.03%	10.84	0.04%
<b>TOTAL</b>	<b>835</b>	<b>6.46%</b>	<b>699.91</b>	<b>3.68%</b>	<b>1,057.25</b>	<b>3.86%</b>
<b>Teleostei (Boney Fish)</b>						
Perciformes (perch-like fishes)	12	0.09%	9.11	0.05%	24.53	0.09%
Centrarchidae (sunfish, lobina)	609	4.71%	618.42	3.25%	857.55	3.13%
<i>Lepomis</i> (common sunfish)	62	0.48%	55.74	0.29%	106.92	0.39%
<i>Lepomis gibbosus</i> (pumpkinseed)	143	1.11%	168.41	0.89%	308.06	1.12%
<i>Lepomis macrochiru</i> (bluegill)	112	0.87%	86.72	0.46%	178.75	0.65%
<i>Lepomis cyanellu</i> (green sunfish)	131	1.01%	103.42	0.54%	211.17	0.77%
<i>Ambloplites</i> (rock basses)						
<i>Ambloplites rupestri</i> (rock bass)	101	0.78%	84.73	0.45%	186.83	0.68%
<i>Micropterus</i> (bass)	226	1.75%	204.83	1.08%	368.77	1.35%
<i>Micropterus salmoidae</i> (largemouth bass)	285	2.20%	334.72	1.76%	599.71	2.19%
<i>Micropterus dolomieu</i> (smallmouth bass)	392	3.03%	409.11	2.15%	679.31	2.48%
<i>Pomoxis</i> (crappies)	14	0.11%	13.81	0.07%	33.11	0.12%
<i>Pomoxis nigromaculatus</i> (black crappie)	164	1.27%	155.92	0.82%	302.11	1.10%
Percidae (true perches)	2	0.02%	0.93	0.00%	3.15	0.01%
<i>Perca flavescens</i> (yellow perch)	103	0.80%	98.21	0.52%	200.92	0.73%
<i>Sander viteus</i> (walleye)	79	0.61%	76.38	0.40%	155.57	0.57%
Sciaenidae (croakers, drum)	28	0.22%	24.65	0.13%	52.54	0.19%
<i>Aplodinotus</i> (river drum, freshwater drum)						
<i>Aplodinotus grunniens</i> (freshwater drum)	81	0.63%	109.85	0.58%	221.96	0.81%

(continued)

TABLE 5.5, CONTINUED.

## CBHC SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass (g)	Proportion
<b>Teleostei (Boney Fish)</b>						
Lepisosteiformes						
Lepisosteidae (gar pikes, gar)						
<i>Lepisosteus</i> (slender gar)						
<i>Lepisosteus osseus</i> (longnose gar)	2	0.02%	1.87	0.01%	776	0.03%
Siluriformes (silures, catfish)						
Ictaluridae (catfishes)						
<i>Ameiurus</i> (bullheads)	37	0.29%	54.62	0.29%	77.76	0.28%
<i>Ameiurus nebulosus</i> (brown bullhead)	58	0.45%	91.7	0.48%	131.24	0.48%
<i>Ictalurus</i> (channel catfish, forktail catfish)	22	0.17%	36.74	0.19%	52.97	0.19%
<i>Ictalurus punctatus</i> (channel catfish)	261	2.02%	339.15	1.78%	452.76	1.65%
Cypriniformes (minnow, sucker)						
Cyprinidae (shiner)	112	0.87%	73.22	0.39%	156.71	0.57%
Catostomidae (suckers, catostomes)						
<i>Ictiobus</i> (buffalo suckers)						
<i>Ictiobus cyprinellu</i> (bigmouth buffalo)	4	0.03%	3.16	0.02%	9.00	0.03%
<i>Moxostoma</i> (redhorse suckers)						
<i>Moxostoma</i> (common sucker)	219	1.69%	184.70	0.97%	366.43	1.34%
<i>Catostomus commersonii</i> (white sucker)	234	1.81%	194.77	1.02%	368.11	1.34%
Esociformes (mudminnows, pikes)						
Esocidae (pickereles, pikes, brochets)						
<i>Esox</i> (pikes)						
<i>Esox lucius</i> (northern pike)	39	0.30%	41.14	0.22%	95.25	0.35%
<i>Esox masquinongy</i> (muskellunge)	2	0.02%	4.11	0.02%	11.08	0.04%
<b>TOTAL</b>	<b>4,236</b>	<b>32.76%</b>	<b>4,336</b>	<b>22.80%</b>	<b>7,420</b>	<b>27.10%</b>
<b>REPTILIA (Reptiles)</b>						
Testudines (tortues, turtles, terrapins, tortoises)						
Emydidae (pond turtles, terrapins)						
<i>Chrysemys pict</i> (painted turtles)	1	0.01%	2.45	0.01%	9.08	0.03%
<i>Graptemys</i> (map turtles)						
<i>Graptemys geographica</i> (northern map turtle)	16	0.12%	22.37	0.12%	56.02	0.20%
<i>Terrapene</i> (box turtles)						
<i>Terrapene ornat</i> (western box turtle)	12	0.09%	14.56	0.08%	29.98	0.11%
Chelydridae (snapping turtles)						
<i>Chelydra serpentina</i> (snapping turtle)	49	0.38%	62.14	0.33%	113.74	0.42%
<b>TOTAL</b>	<b>90</b>	<b>0.70%</b>	<b>114.73</b>	<b>0.60%</b>	<b>245.69</b>	<b>0.90%</b>
<b>Amphibia (Amphibians)</b>						
Anura (frogs, toads)						
Ranidae (riparian frogs)						
<i>Lithobates catesbeianu</i> (American bullfrog)	10	0.08%	11.26	0.06%		
<b>TOTAL</b>	<b>21</b>	<b>0.16%</b>	<b>18.04</b>	<b>0.09%</b>		
<b>ASSEMBLAGE TOTAL</b>	<b>12,930</b>	<b>100%</b>	<b>19,016.00</b>	<b>100%</b>	<b>27,385</b>	<b>100%</b>

and muskrat could all have been trapped along Lake Koshkonong or in adjacent wetlands. Rabbits, raccoon, and deer may have been attracted to field-edge areas or found near forests or oak savannas. These mammals may have been trapped or hunted during other daily pursuits (e.g., farming, collecting shellfish, fishing, gathering wild rice). The presence of domestic dog at the site consists of a dog burial found at the base of a refuse pit and a dog skull from an apparent ceremonial deposit. Dog likely did not contribute to the subsistence resources of the site.

Waterfowl, an important avian resource, nest seasonally along the wetlands and banks of Lake Koshkonong, thus making them semireliable protein resources during the spring and summer months.

The variety of fish shows a diversified capture plan. Site inhabitants appear to have fished with a variety of techniques to target bottom dwelling, shallow water, deep water, and vegetative water fish. Net weirs or fishing lines left along the shore would have provided a delayed capture technique, allowing for the site inhabitants to gather wild rice or shellfish nearby and then check weirs or lines before and after these pursuits.

In sum, the CBHC faunal assemblage shows evidence of a subsistence strategy that reflects the immediate vicinity of both Lake Koshkonong and oak savannas. The proportions of fish, bird, and mammal species exploited indicate a widely varied daily subsistence.

### *Koshkonong Creek Village*

A total of 54,148 vertebrate specimens, weighing 81 kg, were recovered from KCV, of which 44,119 were identifiable (Table 5.6). Mammal and fish are the most represented classes within the identified subsample. Mammals compose 61% of the NISP. Proportionally, the NISP and bone weight for other classes are very low.

Overall, the KCV biomass calculations show an emphasis on mammal protein in the diet of site residents, with a majority of the protein from large mammals (Table 5.7). This pattern indicates a greater emphasis on hunting and trapping than on fishing as part of the daily subsistence economics.

TABLE 5.6.

KCV CLASS SUMMARY DATA, NISP, AND BONE WEIGHT.

Identification	NISP	Proportion	Weight (g)	Proportion
Identified	44,119	81.48%	74,875	92.53%
UNID	10,029	18.52%	6,043	7.47%
TOTAL	54,148	100.00%	80,918	100.00%
Taxonomic Class	NISP	Proportion	Weight (g)	Proportion
Fish	14,903	33.78%	8,414	11.24%
Bird	1,336	3.03%	629.37	0.84%
Mammal	26,983	61.16%	64,921.18	86.71%
Reptile	875	1.98%	901.28	1.20%
Amphibian	22	0.05%	9.41	0.01%
TOTAL	44,119	100.00%	74,875.24	100.00%

TABLE 5.7.

KCV VERTEBRATE TAXONOMIC CLASS  
BIOMASS SUMMARY DATA.

Taxa	Biomass (g)	Proportion
Mammal	80,640	88.68%
Bird	860	0.95%
Fish	9,270	10.19%
Reptile	160	0.18%
Undifferentiated Mammal Sizes		
Class I	6740	0.17%
Class II	425.66	1.08%
Class III	628.08	1.59%
Class III/IV	284.64	0.72%
Class IV	30,979.24	78.46%
Class X	7097.24	17.98%

### Species NISP and Weights and Biomass

Deer bones, which accounted for 28% of the identified assemblage (Table 5.8), are an estimated 56% of the total biomass. White-tailed deer were the most important animal protein resource for the KCV residents. Altogether, Cervidae account for approximately 72% of the total sample biomass.

Medium mammals at the site include those typically found alongside field edges, forests, and riverbanks or lakeshores (e.g., raccoon, rabbits, beaver, muskrat, and squirrels). Such animals provided pelts and a supplementary protein resource.

Based on the species and genera identified, fish were likely caught at the shores of Lake Koshkonong. The lower proportion of fish at KCV than at CBHC may be due to the costs of procuring them from the residents of CBHC or the greater distance to the lake relative to CBHC. The bird sample at KCV shows an emphasis on waterfowl. As at CBHC, waterfowl nest seasonally along the wetlands and banks of Lake Koshkonong, making them a semireliable protein resource during the spring and summer months. In sum, the KCV sample shows evidence for an emphasis on large mammal hunting.

### Deer-Hunting Strategies

Edwards (2017, this volume) has argued that the risk of attack pushed the residents of the Koshkonong Locality to focus on local resources. If true, the local resource focus should also be reflected in hunting strategies and the associated deer body parts in the archaeological assemblage (Binford 1978).

The CBHC assemblage does mirror the expectations for a local hunting strategy, with a 91:109 ratio of cranial elements to upper limbs (Table 5.9). The high prevalence of cranial and other low meat-utility elements suggests that the animals were butchered on-site (Madrigal and Holt 2002; Metcalf and Jones 1988). Ethnographically, cranial elements are not generally brought back to sites over longer distances under situations of risk. However, groups will bring back larger meat packages, which are

TABLE 5.8.

## KCV SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass	Proportion
<b>MAMMALIA (Mammals)</b>						
Artiodactyla	13	0.06%	2761	0.07%	26.89	0.06%
Cervidae	2,569	12.18%	6,157.19	16.48%	7,662.28	16.22%
<i>Bison bison</i> (bison)	2	0.01%	13.16	0.04%		0.00%
<i>Odocoileus virginianus</i> (deer)	4,287	20.33%	14,847.92	39.74%	18,377.86	38.89%
cf. <i>Odocoileus virginianus</i>	1,607	7.62%	6,476.48	17.34%	8,059.62	17.06%
<i>Cervus elaphus</i>	33	0.16%	79.15	0.21%	73.6089	0.16%
cf. <i>Cervus elaphus</i>	4	0.02%	29.37	0.08%	36.5493	0.08%
Carnivora	26	0.12%	53.43	0.14%	66.4907	0.14%
Ursus						
cf. <i>Ursus americanus</i> (American black bear)	1	0.00%	6.72	0.02%	8.36	0.02%
Canidae (dog, wolf)	24	0.11%	69.72	0.19%	86.76	0.18%
Vulpes						
<i>Vulpes vulpes</i> (red fox)	32	0.15%	66.72	0.18%	83.03	0.18%
Procyonidae						
<i>Procyon lotor</i> (raccoon)	362	1.72%	701.49	1.88%	872.97	1.85%
Mustelidae (mustelids)	2	0.01%	6.14	0.02%	7.64	0.02%
<i>Lontra canadensis</i> (river otter)	1	0.00%	1.02	0.00%	1.269	0.00%
<i>Taxidea taxus</i> (American badger)	126	0.60%	336.72	0.90%	419.03	0.89%
Felinae (felines)						
<i>Lynx</i> (bobcats, lynx)						
<i>Lynx rufus</i> (bobcat)	3	0.01%	3.16	0.01%	3.9324	0.01%
Didelphimorphia						
Didelphidae (opossums)						
<i>Didelphis marsupialis</i> (American opossum)	1	0.00%	4.28	0.01%	5.33	0.01%
Lagomorpha (hares, rabbits)	113	0.54%	205.73	0.55%	256.02	0.54%
Leporidae (cottontails)	205	0.97%	308.77	0.83%	384.25	0.81%
<i>Sylvilagus floridanus</i> (eastern cottontail)	434	2.06%	718.42	1.92%	894.03	1.89%
Rodentia	508	2.41%	804.11	2.15%	1,000.67	2.12%
Castoridae						
Castor (beavers)						
<i>Castor canadensis</i> (American beaver)	326	1.55%	683.28	1.83%	850.30	1.80%
Cricetidae						
Ondatra (muskrats)						
<i>Ondatra zibethicus</i> (common muskrat)	1,004	4.76%	981.63	2.63%	1,221.58	2.59%
Sciuridae (squirrel, chipmunk)	634	3.01%	405.72	1.09%	504.90	1.07%
<i>Sciurus</i> (tree squirrels)	207	0.98%	116.97	0.31%	145.56	0.31%
<i>Sciurus carolinensis</i> (gray squirrel)	18	0.09%	9.81	0.03%	12.21	0.03%
<i>Tamias</i>	97	0.46%	63.44	0.17%	78.95	0.17%
<i>Tamias striatus</i> (eastern chipmunk)	28	0.13%	16.2	0.04%	20.16	0.04%
<b>TOTAL</b>	<b>12,667</b>	<b>60.07%</b>	<b>33,194.36</b>	<b>88.85%</b>	<b>41,160.2</b>	<b>87.10%</b>
<b>AVES (Birds)</b>						
Anseriformes (duck, geese, swan, waterfowl)	13	0.06%	9.41	0.03%	14.89	0.03%
Anatidae (duck, geese, swan)	26	0.12%	11.46	0.03%	18.92	0.04%
Anas (dabbling ducks)	139	0.66%	67.8	0.18%	100.64	0.21%
<i>Anas platyrhynchos</i> (mallard)	164	0.78%	56.48	0.15%	82.59	0.17%
Aix (wood ducks)						
<i>Aix sponsa</i> (wood duck)	89	0.42%	67.44	0.18%	98.28	0.21%
Aythya (diving ducks)						
<i>Aythya affinis</i> (lesser scaup)	32	0.15%	16.5	0.04%	26.37	0.06%

(continued)

TABLE 5.8, CONTINUED.

## KCV SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass	Proportion
<b>AVES (Birds)</b>						
<i>Branta</i> (brent geese)						
<i>Branta canadensis</i> (Canada goose)	26	0.12%	16.89	0.05%	26.57	0.06%
Galliformes (fowls)						
<i>Phasianidae</i> (partridge, turkey, grouse)						
<i>Phasianinae</i> (pheasants)	2	0.01%	1.04	0.00%	2.01	0.00%
<i>Phasianus colchicus</i> (ring necked pheasant)	3	0.01%	2.05	0.01%	3.72	0.01%
<i>Meleagris</i> (turkeys)						
<i>Meleagris gallopavo</i> (wild turkey)	1	0.00%	2.06	0.01%	3.74	0.01%
Columbiformes (doves, pigeons)						
Columbidae (doves, pigeons)						
<i>Ectopistes</i> (passenger pigeons)	2	0.01%	0.98	0.00%	1.90	0.00%
<i>Ectopistes migratorius</i> (passenger pigeon)	1	0.00%	0.16	0.00%	0.37	0.00%
Passeriformes (perching birds)						
Corvidae (crows, jays, magpies)						
<i>Corvus</i> (crows)						
<i>Corvus brachyrhyncho</i> (American crow)	3	0.01%	2.16	0.01%	3.90	0.01%
Suliformes (cormorants)						
<i>Phalacrocoracidae</i> (cormorants, shags)						
<i>Phalacrocorax</i> (cormorant)						
<i>Phalacrocorax auritus</i> (double-crested cormorant)	4	0.02%	3.28	0.01%	5.71	0.01%
Accipitriformes (hawks, eagles)						
<i>Accipitridae</i> (hawk, eagle)						
<i>Accipiter</i> (bird hawks)	1	0.00%	0.98	0.00%	1.90	0.00%
<i>Accipiter cooperii</i> (Cooper's hawk)	2	0.01%	1.42	0.00%	2.66	0.01%
Stringiformes (owls)						
<b>TOTAL</b>	<b>531</b>	<b>2.52%</b>	<b>268</b>	<b>0.72%</b>	<b>408</b>	<b>0.86%</b>
<b>Teleostei (Boney Fish)</b>						
Perciformes (perch-like fishes)						
Centrarchidae (sunfish, lobina)						
<i>Lepomis</i> (common sunfish)	3,124	14.82%	1,049.26	2.81%	1,180.96	2.50%
<i>Lepomis gibbosus</i> (pumpkinseed)	672	3.19%	326.57	0.87%	464.89	0.98%
<i>Lepomis gibbosus</i> (pumpkinseed)	104	0.49%	79.06	0.21%	137.87	0.29%
<i>Lepomis macrochiru</i> (bluegill)	246	1.17%	100.26	0.27%	161.45	0.34%
<i>Lepomis cyanellu</i> (green sunfish)	137	0.65%	65.17	0.17%	115.59	0.24%
<i>Ambloplites</i> (rock basses)						
<i>Ambloplites rupestri</i> (rock bass)	107	0.51%	99.31	0.27%	168.60	0.36%
<i>Micropterus</i> (bass)						
<i>Micropterus</i> (bass)	429	2.03%	357.18	0.96%	467.77	0.99%
<i>Micropterus salmoidae</i> (largemouth bass)	294	1.39%	182.06	0.49%	285.17	0.60%
<i>Micropterus dolomieu</i> (smallmouth bass)	283	1.34%	189.2	0.51%	287.41	0.61%
<i>Pomoxis</i> (crappies)						
<i>Pomoxis nigromaculatus</i> (black crappie)	116	0.55%	64.52	0.17%	113.68	0.24%
<i>Pomoxis nigromaculatus</i> (black crappie)	104	0.49%	90.27	0.24%	157.33	0.33%
Percidae (true perches)						
<i>Perca flavescens</i> (yellow perch)	102	0.48%	76.18	0.20%	131.86	0.28%
<i>Perca flavescens</i> (yellow perch)	163	0.77%	77.52	0.21%	117.88	0.25%
<i>Sander viteus</i> (walleye)	122	0.58%	62.05	0.17%	116.89	0.25%
Sciaenidae (croakers, drum)						
<i>Aplodinotus</i> (river drum, freshwater drum)						
<i>Aplodinotus grunniens</i> (freshwater drum)	61	0.29%	43.8	0.12%	99.39	0.21%
<i>Aplodinotus grunniens</i> (freshwater drum)	80	0.38%	73.19	0.20%	137.20	0.29%

TABLE 5.8, CONTINUED.

## KCV SPECIES SUMMARY DATA.

Taxa	NISP	Proportion	Weight (g)	Proportion	Biomass	Proportion
<b>Teleostei (Boney Fish)</b>						
Lepisosteiformes						
Lepisosteidae (gar pikes, gar)						
<i>Lepisosteus</i> (slender gar)						
<i>Lepisosteus osseus</i> (longnose gar)	3	0.01%	3.05	0.01%	11.14	0.02%
Siluriformes (silures, catfish)						
Ictaluridae (catfishes)						
<i>Ameiurus</i> (bullheads)	314	1.49%	104.16	0.28%	142.34	0.30%
<i>Ameiurus nebulosus</i> (brown bullhead)	116	0.55%	98.72	0.26%	135.39	0.29%
<i>Ictalurus</i> (channel catfish, forktail catfish)	27	0.13%	20.41	0.05%	29.93	0.06%
<i>Ictalurus punctatus</i> (channel catfish)	184	0.87%	109.42	0.29%	148.96	0.32%
Cypriniformes (minnow, sucker)						
Cyprinidae (shiner)						
	201	0.95%	119.44	0.32%	203.41	0.43%
Catostomidae (suckers, catostomes)						
<i>Moxostoma</i> (redhorse suckers)	61	0.29%	41.52	0.11%	86.04	0.18%
<i>Catostomus</i> (common sucker)	34	0.16%	15.54	0.04%	36.80	0.08%
<i>Catostomus commersonii</i> (white sucker)	14	0.07%	7.36	0.02%	17.55	0.04%
Esociformes (mudminnows, pikes)						
Esocidae (pickerels, pikes, brochets)						
<i>Esox</i> (pikes)	17	0.08%	18.03	0.05%	37.54	0.08%
<i>Esox lucius</i> (northern pike)	32	0.15%	20.39	0.05%	46.12	0.10%
<b>TOTAL</b>	<b>7,799</b>	<b>36.99%</b>	<b>3,816</b>	<b>10.22%</b>	<b>5,522</b>	<b>11.69%</b>
<b>REPTILIA (Reptiles)</b>						
Testudines (tortues, turtles, terrapins, tortoises)						
Emydidae (pond turtles, terrapins)						
<i>Chrysemys picta</i> (painted turtles)	2	0.01%	1.77	0.00%	7.31	0.02%
<i>Graptemys</i> (map turtles)						
<i>Graptemys geographica</i> (northern map turtle)	16	0.08%	17.82	0.05%	42.93	0.09%
Chelydridae (snapping turtles)						
<i>Chelydra serpentina</i> (snapping turtle)	33	0.16%	36.4	0.10%	75.00	0.16%
<b>TOTAL</b>	<b>67</b>	<b>0.32%</b>	<b>72.06</b>	<b>0.19%</b>	<b>163.59</b>	<b>0.35%</b>
<b>Amphibia (Amphibians)</b>						
Anura (frogs, toads)						
Ranidae (riparian frogs)						
<i>Lithobates catesbeianus</i> (American bullfrog)	4	0.02%	2.02	0.01%		
<b>TOTAL</b>	<b>22</b>	<b>0.11%</b>	<b>9.41</b>	<b>0.03%</b>		
<b>ASSEMBLAGE TOTAL</b>	<b>21,086</b>	<b>100.00%</b>	<b>37,360</b>	<b>100.00%</b>	<b>47,254</b>	<b>100.00%</b>

TABLE 5.9.

## CBHC DEER BODY PARTS.

Body Parts	NISP	Proportion	MNE	Proportion
Cranial	423	12.18%	182	16.90%
Axial	804	23.15%	296	27.48%
Upper Limb	829	23.87%	218	20.24%
Lower Limb	1,417	40.80%	381	35.38%
Total	3,473	100.00%	1,077	100.00%

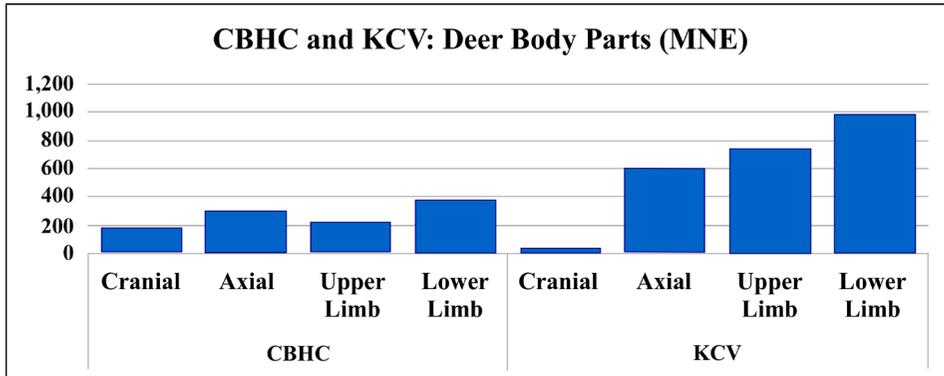


FIGURE 5.1. CBHC and KCV deer body parts comparison.

TABLE 5.10.

KCV DEER BODY PARTS.

Body Parts	NISP	Proportion	MNE	Proportion
Cranial	382	6.48%	31	1.31%
Axial	1,197	20.31%	602	25.52%
Upper Limb	1,524	25.86%	745	31.58%
Lower Limb	2,791	47.35%	981	41.59%
Total	5,894	100.00%	2,359	100.00%

associated with upper-limb elements (Hickerson 1965; Madrigal and Holt 2002). Given the evidence for the relatively high levels of violence in the regions (see Jeske, this volume) and the energy necessary to transport full deer carcasses, the animals were likely killed near CBHC (Binford 1978; Hickerson 1965).

At KCV, the MNE ratio of cranial to upper limb parts is 31:745 (Figure 5.1). This skewed ratio suggests that the procured deer were hunted and butchered farther from the main village than the CBHC sample (Table 5.10). KCV residents may have engaged in a combination of field-edge hunting and coordinated longer-distance hunting trips. This assertion is supported by the relatively high proportion of terrestrial fauna and the low reliance on fish (Clinton and Peres 2011; Linares 1976). Alternatively, if groups at CBHC pursued local deer, a portion may have been butchered at CBHC, with only larger meat packages brought to KCV. This pattern suggests that CBHC and KCV inhabitants had a coordinated, combined subsistence strategy that was integrated into the overall subsistence system of the locality. This subsistence system included site specialization and an exchange of resources.

## Discussion

Although the locations are separated by fewer than 3 km, the data indicate that the residents of KCV and CBHC lived in different environmental contexts and relied on distinct faunal exploitation strategies. Previously, Edwards (2017) has

argued that KCV residents relied more heavily on agricultural pursuits. I suggest that subsistence distinctions also apply to fauna: KCV residents, situated inland, relied most heavily on deer and other field-edge animals. CBHC residents, situated along the lake, exploited most heavily water-edge resources (Figures 5.2 and 5.3). The different subsistence foci worked to facilitate a locality-wide economic system consistent with a complex system (*sensu* O’Shea 1989).

If the data reflect a complex system, the residents of KCV and CBHC focused on immediately available resources from different ecological niches, which were

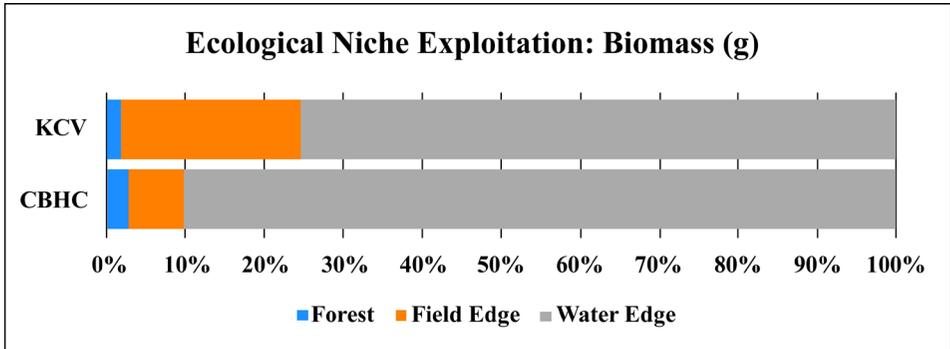


FIGURE 5.2. Village site comparison: ecological niche exploitation (NB: includes select species—see methods section).

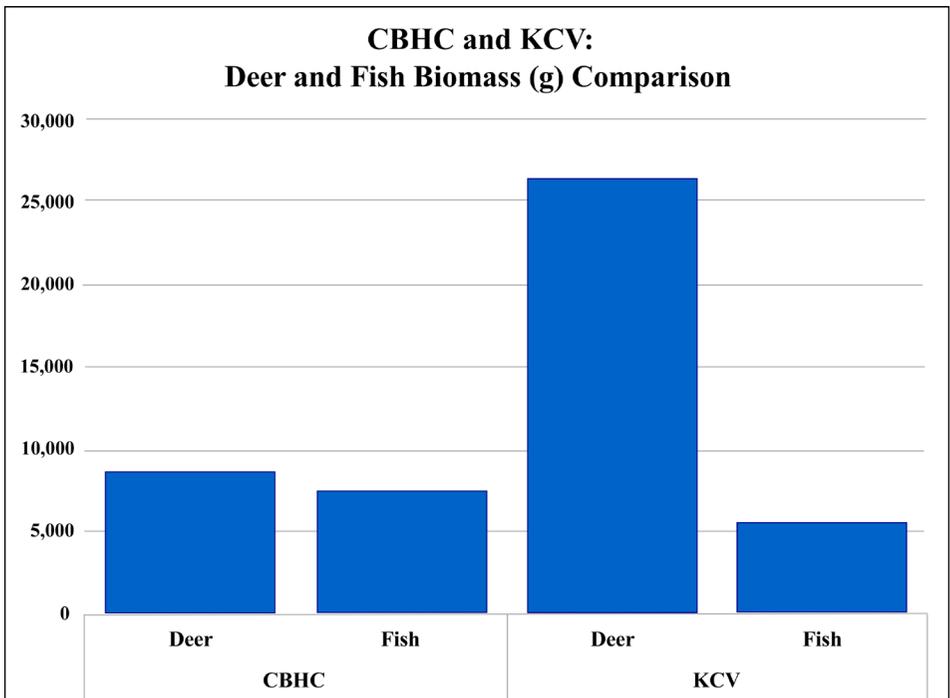


FIGURE 5.3. CBHC and KCV deer and fish biomass comparison.

exchanged with members from different sites during times of need or other socially mediated circumstances. This coordinated exchange of immediately local resources would have benefited the residents of both village sites by diversifying their diet and reducing competition for resources between villages.

The apparent greater focus on agricultural pursuits at KCV would increase the efficiency of field-edge hunting. However, it would also reduce available time or energy to invest in pursuing water-edge game and fish. This expectation fits the faunal data for CBHC and KCV.

At CBHC, the lower focus on maize agriculture afforded time for village residents to obtain wetland resources and exchange them with the residents at KCV. Such a focus created opportunities for efficient exploitation of the immediate environment, so long as each village was connected through reciprocal networks or other types of exchange. For example, the exchange network between villages may account for some of the lake-dwelling fish genera in the KCV assemblage.

There is evidence for the movement and sharing of resources that goes beyond strict economics in this locality. Carpiaux (2018) argues for the movement of people between CBHC and KCV for communal activities. Such communal activities often involve food sharing and can be used to reinforce economic and social obligations within a larger group context (Halstead and O’Shea 1989). Therefore, the network of “complex economic systems” may be applicable beyond the mere exchange of immediately local foods. But it is one aspect that shows how a nuanced approach to analyses at the Koshkonong Locality can provide insight into a complementary interaction between villages. Essentially, the intersection of group identity and economic relationships are entangled within the archaeological record. However, the faunal evidence highlights new aspects of the nature of the interaction for both subsistence and social networking within the Koshkonong Locality. These were people living in discrete microenvironments, utilizing and exploiting their distinct immediate resources but operating on multiple levels between each other within a shared group identity.

## Acknowledgments

I would like to thank the landowners at CBHC and KCV for granting excavation access to UW–Milwaukee professors, students, and researchers over the years. A special thanks must be granted to Jean Hudson and Terry Martin for their continued advice and support in all things zooarchaeological. And thanks to the UWM Archaeological Research Laboratory, UWM Zooarchaeological Laboratory, and the UW–Madison Zoological Museum for access to these collections and the necessary comparative resources.

## Note on Contributor

### *Rachel C. McTavish*

McTavish is an applied anthropologist at ESCA Tech, Inc. She received her PhD from UW–Milwaukee in 2019. Her dissertation focused on cultural continuities

and divergences between Langford and Oneota groups in the lower Lake Michigan basin. She has taught at various universities and colleges, such as Beloit College, College of Lake County, Carroll University, and Ripon College. Her research interests include cultural risk management, village-based economics, and environmental adaptation.



## 6

# The Social Landscape of Eleventh- to Fifteenth-Century Lake Koshkonong

Robert J. Jeske

*DEPARTMENT OF ANTHROPOLOGY, UNIVERSITY OF WISCONSIN–MILWAUKEE*

Multiple lines of evidence provide the opportunity for a synthetic discussion of the origin, growth, and waning of the human occupation of the Lake Koshkonong region between AD 1050 and AD 1430. Data collected over 20 years of excavations and survey support a model of human exigencies, interaction, agency, and constraints that is more complex and nuanced than previously considered. Traditional ideas explaining the nature of Wisconsin Oneota sites rely on simple diffusion of cosmology, social structures, and technology from the American Bottom to inhabitants of Wisconsin or the migration of people from the American Bottom and the subsequent diffusion of their cosmology, social structures, and technology to local populations—but with less sophistication. People in this region were more dependent on maize, more engaged in violent activities, and more economically and socially independent of other contemporary groups than previously recognized.

**KEYWORDS** Oneota; Oneota Settlement Patterns; Lake Koshkonong Village Size; Oneota Subsistence; Oneota Technology; Lake Koshkonong Mortuary Patterns

## Introduction

At the northern edge of the Prairie Peninsula, the landscape of southern Wisconsin, northern Illinois, and northern Indiana yields clustered patterns of contemporaneous but distinct eleventh- through fifteenth-century artifact styles, architectural forms, settlement types, and subsistence practices. Archaeologists have produced

multiple models for the origins and disappearances of these archaeological clusters, and the arguments have shifted as new sites have been excavated, new surveys have revealed landscape utilization patterns, and new dating techniques have provided refined chronologies for site occupations (cf. Emerson 1999; Gibbon 1972b; Goldstein and Richards 1991; Hall 1962, 1993; Overstreet 1995; Richards and Jeske 2002). The focus of this article is to use recently generated data to present an interpretation of the eleventh- through fifteenth-century cultural landscape at Lake Koshkonong and how that landscape fit into the larger world of the Great Lakes and midwestern United States at that time. The data support an interpretation that the clustered material-culture signatures indicate ethnic genesis, boundary formation, and boundary maintenance between groups sharing the landscape with each other while negotiating social, political, and religious relationships with groups from the American Bottom and other regions.

Almost four decades ago, I argued that the distinctive archaeological cultures that archaeologists refer to as Upper Mississippians—Oneota, Fort Ancient, Langford, Fisher, Oliver phase—were autonomous groups who formed ethnoidentities in the face of cultural and economic contact with a larger social polity—the Middle Mississippian archaeological entity centered at Cahokia and the American Bottom (Jeske 1992b). The argument was far from the first one along these lines, but it provided a more specific catalyst for ethnogenesis than most previous arguments. The model followed ethnographic examples of peripheralized maize agriculturalists, which suggested that people form ethnic boundaries in large part to provide economic protection for individuals and lineages from larger or more powerful polities (Sandstrom 1991). The boundaries that people form are fluid in their membership and contingent on their local circumstances and larger regional networks of relationships. While fluid, these boundaries are meaningfully created and often maintained using material culture as markers of identity, solidarity, and connectedness. Like all ethnographic analogy, these basic concepts were meant to be tested using archaeological data (see Binford 1967; Kuznar and Jeske 2006; Wylie 1992). Here, we can use the clustered material culture proposed to represent different ethnic groups subsumed under the archaeological rubrics of Upper Mississippian and Middle Mississippian.

How people make and maintain cultural boundaries and connections can be fully examined using a world-systems approach, particularly if one incorporates concepts from social-network analysis. The world systems, or core-periphery, approach (cf. Burch 2005; Chase-Dunn and Hall 1991; Frank 1993; Hall and Chase-Dunn 1993; Wallerstein 1974) provides a concrete and testable mechanism for examining cultural interactions beyond the fuzzy idea of “influence,” an unexplained, radioactive-like diffusion of ideas (cf. Egan-Bruhy 2014; Emerson 1999; Goldstein and Richards 1991; Jeske 1999b; Peregrine 1991a). The idea of a core-periphery network fits well with the idea of landscapes and relationships across landscapes. We can look at these relationships at different scales with the expectation that not all relationships will be treated the same way or have the same effect on the agents and agencies involved. We can appreciate the concept that individual societies are essentially nodes on the network of economic, social, political, and martial relationships.

Over time, some societies may be able to leverage an advantage—geographic position, control of important resources, population density—to achieve some level of

control over other societies (Chase-Dun and Hall 1991; Hart et al. 2017; Renfrew 1996). Their ability to control external exchange in some combination of ideas, commodities, luxuries, and military threat may result in the internal reorganization of economic and political structures in the disadvantaged groups—creating a core-periphery dynamic (Chase-Dunn and Hall 1991). The peripheral groups are reorganized or reorganize themselves to adapt to their new relationship to the core. It is critical to recognize that these core-peripheral relationships are not just one-way streets. Groups we perceive as peripheral may accommodate, resist, or use a combination of accommodation and resistance in their interactions with the center or core (Deagan 1990; Hinnebusch 2011; Moore 2012; Stein 1999). The specific processes of accommodation and resistance include emulation, military threat or defense, economic coercion or cooperation, political associations, and spatial relocation (in-migration or out-migration). These processes of accommodation and resistance are often, although not always, reflected in material culture (Blom 1969; Deagan 1990; Rotman and Fuentes 2016).

The complexity of the network in terms of geographic distance and obstacles, political and military alliances, rivalries, physical mobility, resource availability, and historical traditions affects the nature of the relationships (Brumfiel 1996; Dørmøker et al. 2016; Hart et al. 2016; Kardulias 1990; Lulewicz and Coker 2018). The nature of the network includes weak links and strong links. Strong links are relationships between people with multiple shared connections who are deeply embedded in one another's networks (McCulloch 2019). Weak links are relationships between people who have few shared connections, perhaps because they are separated by distance, a physical barrier, political boundaries, or cultural differences.

As opposed to a simple “wave model” of diffusion (Milroy and Milroy 1985:339) often posited as a cause of cultural change, weak links are important for significant cultural change (Milroy and Milroy 1992). Although people with weak links may not interact frequently, these interactions are likely to expose them to innovative or revolutionary ideas. These weak-link interactions may result in relatively rapid culture change through exchange of distinctly different cultural information (Milroy and Milroy 1985). New ideas may be incorporated rapidly within a group, particularly through emulation and competition between individuals with strong ties (Burt 1987; Ryan and Gross 1943). To be clear, simple exposure to new ideas or behaviors does not necessarily result in adoption of those ideas or behaviors (McCullough 2019). Somewhat counterintuitively, strong ties can foster conservatism in culture due to repeated similar interactions and behaviors becoming doxa, keeping new ideas at bay. Ultimately, the cultural adoption of any idea is contingent on a multitude of factors, including perceived functional need, added value, the strength of historical traditions, and the nature of the relationships between actors (Mizuchi 1994; Ryan and Gross 1943; Scott 2011).

Using the concept of these links within a core-periphery perspective, we can see that interactions of the core with peripheral groups are likely to be weak links, while interactions within the core itself and within any peripheral group are more likely to be strong links (e.g., Brumfiel 1996; Emerson 2012; Webster 1999). The exchange of people, new materials, and innovative ideas between the periphery and the core is likely to alter both the core and the periphery. Within this complex, networked, competitive flow of ideas and materials, localized groups of people

with strong links are likely to incorporate themselves—and may reinforce that corporateness with the tools they use, the clothes they wear, the language they speak, and the foods that they eat (Barth 1969; Goodby 1998; Haaland 1969; Jeske 1989; Stark 1999; Webster 1999). These strongly linked groups have their own traditions and history, and they still interact with other peripheral and semiperipheral groups in the economic network. Innovations will be incorporated by different groups to different degrees and in different time frames (Bobbie 2012; Chase-Dunn and Hall 1991; Jeske 1999a, 2006; Kohl 1996; Stein 2002). The ebb and flow of physical and symbolic interactions from core to periphery and back should be expected to result in cyclical shifts of power and populations through time (Frank 1999).

Returning to the northeastern Prairie Peninsula, many archaeologists have long assumed some form of core-periphery relationship between Cahokia and its neighbors, as attested to by edited volumes entitled *Cahokia and the Hinterlands* (Emerson and Lewis 1991) and *New Perspectives on Cahokia: Views from the Periphery* (Stoltman, ed. 1991). While few of the authors in these volumes took a world-systems view of Cahokia and its contemporary neighbors, almost all accepted Cahokian “influence,” “inspiration,” or a “dominant/subordinate dynamic” of one sort or another as having altered or created new societies in the north (Goldstein 1991; Goldstein and Richards 1991; Stoltman 1991b). Others did take on an explicit world-systems approach (Peregrine 1991a, 1991b). Regardless of an implicit or explicit core-periphery point of view, it seems clear that some form of social network existed in which prehistoric cultures of the southern Great Lakes operated. Recent research strongly supports the notion that the regional relationships of the eleventh through fifteenth centuries were centered on a broadly shared set of cosmological or religious beliefs, coupled with a subsistence regime of maize consumption and the attendant changes in settlement and technologies for growing, storing, and using maize (Edwards 2017; Edwards et al. 2017; Emerson et al. 2005; Emerson et al. 2010; Jackson 2017; Jackson and Emerson 2014; Karsten et al. 2019; Schneider 2015; Sterner 2018). These relationships did not occur in a vacuum. It does appear that contemporary relationships with groups outside the region and long-standing traditional patterns of landscape utilization shaped the items, activities, and symbols that people chose to share, to keep, or to reject (Clauter 2012; Emerson 1999, 2012; Goldstein and Richards 1991; Hall 1991; Overstreet 1978, 1997, 2001; Richards and Jeske 2002; Rosebrough 2010; Salkin 2000; Stoltman 2000). The Koshkonong Locality exemplifies these patterns of relationships during the eleventh through fifteenth centuries.

## Settlement Patterns, Village Size, and Population Density

The first thing to be noted is the nature of the Oneota occupation in the locality itself (see Figure 1.2). For all the nutritional potential of the local environment that has been demonstrated in earlier articles in this volume, there are surprisingly few Oneota sites at Lake Koshkonong, and they are relatively small. Altogether, there appear to be no more than six occupations one can reasonably call villages: clusters of permanent structures demonstrating year-round occupation, large food-storage and processing facilities, and related mortuary facilities. Scattered among them are

a number of smaller ephemeral sites that likely represent short-term special-activity camps. There is no evidence for any Oneota-related mound or separate cemetery sites in the locality. The restricted distribution of Mississippian and Oneota sites in southern Wisconsin is not an artifact of sampling bias, as demonstrated by large-scale systematic surveys of the region (Goldstein 1991; Goldstein and Richards 1991). Just as importantly, the radiocarbon record indicates that the sites clustered at Lake Koshkonong are essentially contemporaneous occupations dating between circa AD 1050–1100 and circa AD 1430–1450 (see Table 1.1; see Figure 1.4). The data are not precise enough at this time to define sharper chronological boundaries or phases within those boundaries.

The village sites appear to be set in defensive positions, with steep slopes protecting them from an approach by water but permitting quick access to the water for village residents if attacked from land (see Figure 1.2). The D shape of the site locations means that a threatened village could be quickly reinforced by other groups via short interior lines of travel. Their layout strongly suggests that they were prepared for violent interactions.

Skeletal data support an interpretation of a violent landscape. Of 11 individuals discovered to date at CBHC, 4 (36%) demonstrate clear evidence for interpersonal violence, including embedded arrow points, cut marks on ribs, and cranial-bone depression fractures (Jeske and Sterner-Miller 2014; Jeske et al. 2017). While the sample size is small, there is still a remarkably high frequency of skeletal trauma (Milner et al. 1991a, b). The skeletal data are supported by the evidence of human blood on 2 of 26 (7.7%) tested triangular artifacts that fall under the morphofunctional category of Madison points (Sterner and Jeske 2017:12). There is equivocal evidence for interpersonal violence in the form of crushed cranial vaults and perimortem dismemberment at KCV and Schmeling (Edwards and Jeske 2016; Foley 2011; Jeske and Edwards 2014). While these data are circumstantial, they are not inconsistent with the CBHC skeletal pattern for interpersonal violence.

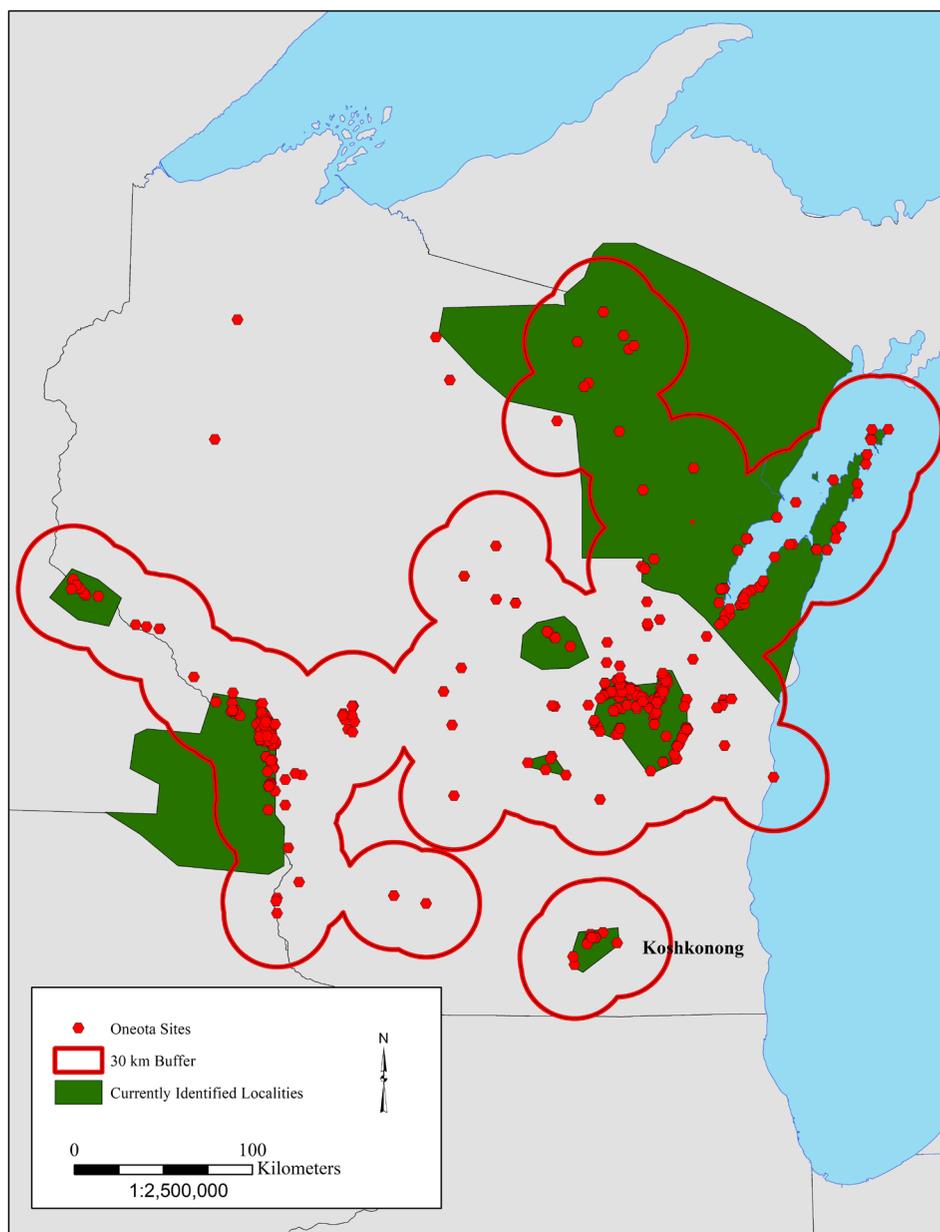
While there is evidence that Koshkonong Locality occupants lived in a violent social milieu, their antagonists are unknown. Aztalan, Effigy Mound, and Collared Ware sites appear to have overlapped chronologically with the Koshkonong Locality sites, and their inhabitants may have been adversaries of the inhabitants of the Koshkonong Locality. However, given that there are numerous Effigy Mound sites within the Koshkonong Locality itself—the Kumlein Effigy Mound Group is clearly visible from KCV and Schmeling—it seems unlikely that the people who built Effigy Mounds were foes. Collared Ware sites are also found within the locality, so their occupants are also unlikely to have been enemies. Aztalan occupants were also potential competitors for resources, and it also appears that the start of palisade construction at Aztalan began at or very near the earliest Oneota occupations at Koshkonong (Krus et al. 2019). Yet, Aztalan was a mere 5 to 6 hours away, whether one canoed down the Crawfish River or walked across the rolling savanna. This proximity may have been just a bit too close to sit next to a consistent enemy. Nonetheless, it is interesting to note that, while all these different occupations of the landscape overlapped chronologically, by circa AD 1250–1300, Oneota sites were well established near Lake Koshkonong but Aztalan, Effigy Mounds, and Collared Ware sites had been abandoned.

Perhaps the most likely candidate for a regular antagonist would be people from other Oneota localities. In fact, the occupations at the Koshkonong Locality are distinctly isolated from other localities. The geographic isolation of the Koshkonong Locality compared to any other Wisconsin Oneota or Illinois Upper Mississippian locality is stark (Figure 6.1). All other Oneota localities are within 35–45 km of another locality. The occupants at the Koshkonong Locality were 70 km from their nearest Oneota neighbors, with one caveat: between 20–30 km northwest of Koshkonong, there are four known multicomponent sites that contain small amounts of Oneota pottery (Picard et al. 2018; Schroeder 2002, 2007). These sites are on the shores of Lake Waubesa and Lake Kegonsa, which are impounded sections of the Yahara River that flows to the Rock River 10 km south of Lake Koshkonong. There is no indication that these were villages with structures; the sites appear to be small seasonal encampments (Picard et al. 2018). We currently consider them to be part of the Koshkonong Locality settlement pattern.

Along with their isolation, the small number and tight clustering of the sites surrounding Lake Koshkonong suggest a low population density (see Figure 1.2). Accurately estimating the density of occupation at the Koshkonong Locality is complicated by sample size and excavation strategies. Unlike many of the Mississippian sites of the American Bottom, none of the Koshkonong Locality sites have seen large-scale stripping that exposed organizational layouts. Koshkonong Locality excavation units were generally placed in the areas of highest artifact concentrations. The CBHC site is an exception, with a relatively larger sample size, several large block units, and units deliberately placed in areas with lower artifact concentrations to provide a more representational sample of the site.

Nonetheless, it is clear that the population at Koshkonong was never large. We can estimate site populations based on floor sizes from house structures reported at several sites in the Koshkonong Locality as compared with ethnographic and archaeological examples of Mississippian and modern agricultural populations (Jeske 2000; Milner 1986; Sandstrom 1991; Sterner 2018). Using generous estimates of the number of potential houses at the six inferred village sites, the total Koshkonong Locality probably never exceeded between 200 and 500 individuals. Looked at another way, population never exceeded 1,200–2,400 people/km<sup>2</sup> of site occupancy. Compared to the contemporary occupation at Aztalan, only 20 km to the north, the Koshkonong Locality values are not dense. Richards (1992) estimates the population within the palisades of Aztalan at roughly 340 individuals, or 4,250 people/km<sup>2</sup>, clearly a denser occupation on the landscape than at the Oneota sites.

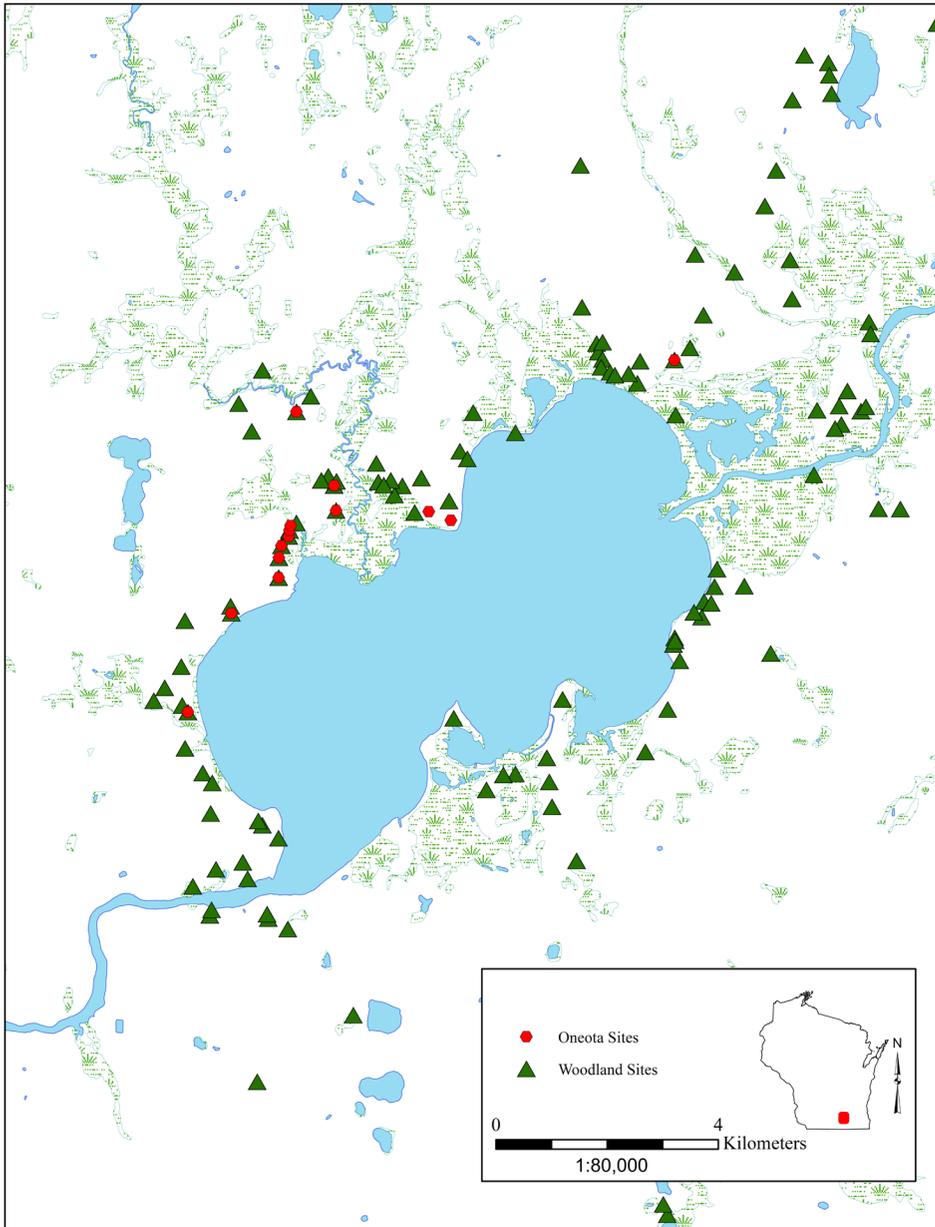
The relative lack of people at Koshkonong appears to have had nothing to do with agricultural potential (see Figure 4.6). Based on estimates for indigenous maize productivity (Schroeder 1999), Koshkonong occupants would have needed to tend, at most, 10% of the high-potential agricultural soils within a 1-hour walking distance from their sites (Edwards 2017). There was seemingly no environmental impediment to population growth, which makes the 400-year occupation of the lakeshore even more unusual, particularly when one recognizes the number and sizes of sites from earlier time periods around the lake. The impression one gets is that populations contracted significantly by circa AD 1100 and then went to zero by circa AD 1450, when the locality was abandoned (Figure 6.2).



**FIGURE 6.1.** Wisconsin Oneota sites surrounded by 30 km buffer. Note the isolation of the Koshkonong Locality.

### Diet, Agricultural, and Other Food Resource Use

Oneota food data at the Koshkonong Locality do not comport very well with either local Late Woodland antecedents or contemporary groups, such as Lang-



**FIGURE 6.2.** Locations of Woodland and Oneota sites within 5 km of the Lake Koshkonong shoreline (Wisconsin Historical Society 2015).

ford or Fisher populations in northern Illinois. The occupants at Koshkonong were highly dependent on agriculture and they appear to have used wild rice at higher levels than did occupants of other localities (Edwards 2017; Egan-Bruhy and Nelson 2014). Just as importantly, the mix of maize varieties that composes the diet is unusual. Maize cobs from Crescent Bay Hunt Club (CBHC) are heav-

ily biased toward 10- to 12-row varieties (Picard 2013). Yet, maize from earlier Late Woodland sites in southern Wisconsin and northern Illinois is dominated by eastern 8-row cobs (Emerson and Titelbaum 2000). Even more interesting, the proportion of high-row maize at CBHC is more similar to American Bottom corn assemblages than it is to that of the Middle Mississippian occupation at Aztalan. In the American Bottom, 12-row cobs are dominant until the thirteenth-century Moorehead phase (Simon 2000). The twelfth- through thirteenth-century occupants at Aztalan maintained the same 8-row dominated maize regime as did their Late Woodland antecedents (Picard 2013). We do not have good data from most other Oneota localities, but in northeastern Illinois, 8-row maize dominates in the fourteenth-century Fisher component at the Hoxie site (Egan-Bruhy and Nelson 2014). The reasons that Koshkonong Locality farmers preferred different varieties of maize than did their neighbors are not clear, but their use of 10- to 12-row varieties does set them apart.

They were also set apart from their neighbors by their nonmaize diet. Along with their ubiquitous use of wild rice, Koshkonong Locality occupants took much greater advantage of the Eastern Agricultural Complex than did neighboring groups. Sunflower, knotweed, maygrass, bean, amaranth, barnyard grass, and tobacco are found at one or all sites from the locality. Little barley and aquatic tubers (possibly American lotus) are also tentatively identified from their assemblages (Table 6.1; Edwards 2017; Egan-Bruhy 2001a; Egan-Bruhy and Nelson 2010; Olsen 2003).

Another aspect of Koshkonong Locality occupants' diet that sets them apart from their contemporaries is its relative lack of meat. A combination of zooarchaeological bone weight and isotopic data indicate that fish and shellfish compose no more than 10%–15% of the diet (Edwards 2017; McTavish 2019). However, the composition of the meat that they did eat is representative of diverse grassland, savanna, forest, and wetland environments that surrounded them. An impressive range of 84 different species has been identified to date, including 20 mammals, 26 birds, 17 fish, 5 reptiles and amphibians, and 17 shellfish (Table 6.2). The number of species is undoubtedly undercounted due to difficulties in separating closely related species of a genus or family. Virtually all the species are found at CBHC, with subsets reported from the smaller assemblages at Koshkonong Creek Village, Schmeling, and Carcajou Point.

McTavish (2019, this volume) suggests that the relatively small proportion of aquatic animals in the assemblages represents a strategy by occupants of hunting, fishing, and trapping efficiently near their villages. Fish species come from both inshore and offshore environments, and the differential distribution of fish, terrestrial mammals, and maize quantities between CBHC and KCV suggests a complex economic interrelationship of specialization within and exchange between villages (see also Edwards 2017).

In recent years, a number of researchers have used various combinations of archaeobotanical, stable isotope, and dental data to make interregional or inter-site comparisons of post-AD 1000 people's diets (e.g., Blewitt and King 2017; Edwards 2017; Egan-Bruhy and Nelson 2014; Emerson et al. 2005; Hargrave et al. 2017; Karsten et al. 2019). It must be noted that these regional or site comparisons are all hampered due to small and highly varying sample sizes; sometimes incompatible data

TABLE 6.1.

PLANT SPECIES IDENTIFIED FROM KOSHKONONG LOCALITY ONEOTA CONTEXTS.	
<b>Domesticates/EAC/Economically Important Seeds</b>	<b>Wild Nuts</b>
<i>Zea mays</i> (maize)	<i>Carya ovata</i> (hickory)
<i>Cucurbita pepo</i> (squash)	<i>Corylus</i> sp. (hazelnut)
<i>Phaseolus vulgaris</i> (common bean)	<i>Juglans nigra</i> (black walnut)
<i>Chenopodium</i> sp. (goosefoot)	<i>Quercus</i> sp. (acorn)
<i>Helianthus annuus</i> (sunflower)	
<i>Hordeum pusillum</i> (little barley)	<b>Other Edible Wild Plants</b>
<i>Iva</i> sp. (sumpweed)	<i>Strophostyles helveola</i> (wild bean)
<i>Polygonum</i> spp. (knotweed)	<i>Portulaca</i> sp. (purslane)
<i>Phalaris caroliniana</i> (maygrass)	<i>Viola</i> sp. (violet)
<i>Amaranthus</i> sp. (amaranth)	<i>Typha</i> sp. (cattail)
<i>Zizania aquatica</i> (wild rice)	<i>Scirpus</i> sp. (bulrush)
<i>Echinochloa</i> sp. (barnyard grass)	<i>Crataegus</i> sp. (hawthorn)
<i>Nicotiana</i> sp. (tobacco)	<i>Fragaria</i> sp. (strawberry)
	<i>Prunus nigra</i> (Canada plum)
<b>Potential Medicinal or Other Uses</b>	<i>Prunus pensylvanica</i> (pin cherry)
Asclepidaceae (milkweed)	<i>Rhus</i> sp. (sumac)
<i>Epigaea</i> sp. (trailing arbutus)	<i>Rubus</i> sp. (raspberry)
Euphorbiaceae (spurge family)	<i>Vaccinium</i> sp. (blueberry)
Asteraceae (aster family)	<i>Gaylussacia baccata</i> (huckleberry)
Brassicaceae (mustard family)	<i>Solanum</i> sp. (nightshade)
<i>Cornus</i> sp. (dogwood)	Cf. <i>Nelumbo lutea</i> (American lotus)
Fabaceae (pea family)	
<i>Galium</i> sp. (bedstraw)	
<i>Diervilla lonicera</i> (bush honeysuckle)	
Lamiaceae (mint family)	
<i>Najas</i> sp. (naiad)	
Poaceae small (grass family)	
<i>Potentilla</i> sp. (cinquefoil)	
<i>Verbena</i> sp.	
Bud	
Fungus	

recovery and reporting; issues of site function; temporal differences; and ambiguities in correlating data with interpretations.

Taking into account these caveats, the data suggest a broad pattern of rapidly increasing maize dependence across the Prairie Peninsula after AD 1000. With the exception of inferred elite individuals at Middle Mississippian sites, people across the northern edge of the Prairie Peninsula generally appear to have increased their reliance on maize to a large extent (approx. 50% or more) for their caloric intake. Other cultigens, wild plants, and animals constituted the rest of the diet. However, significant variation across time and space is also clear, particularly regarding the nonmaize portions of the diet (Table 6.3). Some of this variation appears to have been related to the immediate environment surrounding a site and some appears to have been related to status, age, and gender relations (Ambrose et al. 2003; Edwards 2017; Emerson et al. 2005; Hedman 2006; Karsten et al. 2019).

Residents at the Koshkonong Locality ate relatively less meat and as much, if not more, maize than nearby Langford site occupants (Edwards 2017). They ate

TABLE 6.2.

## ANIMAL SPECIES IDENTIFIED FROM KOSHKONONG LOCALITY ONEOTA CONTEXTS.

<b>Mammals</b>	<b>Birds</b>
<i>Bison bison</i> (bison)	<i>Anas platyrhynchos</i> (mallard)
<i>Odocoileus virginianus</i> (deer)	<i>Anas crecca</i> (green-winged teal)
<i>Cervus elaphus</i> (elk)	<i>Lophodytes cucullatus</i> (hooded merganser)
<i>Ursus americanus</i> (American black bear)	<i>Aix sponsa</i> (wood duck)
<i>Canis lupus familiaris</i> (domestic dog)	<i>Aythya affinis</i> (lesser scaup)
<i>Vulpes vulpes</i> (red fox)	<i>Branta canadensis</i> (Canada goose)
<i>Procyon lotor</i> (raccoon)	<i>Gavia immer</i> (common loon)
<i>Lontra canadensis</i> (river otter)	<i>Phalacrocorax auritus</i> (double-crested cormorant)
<i>Martes americana</i> (marten)	<i>Ardea alba</i> (great egret)
<i>Neovison vison</i> (American mink)	<i>Ardea herodias</i> (great blue heron)
<i>Taxidea taxus</i> (American badger)	<i>Phasianus colchicus</i> (ring necked pheasant)
<i>Mephitis mephitis</i> (striped skunk)	<i>Bonasa umbellus</i> (ruffed grouse)
<i>Lynx rufus</i> (bobcat)	<i>Meleagris gallopavo</i> (wild turkey)
<i>Didelphis virginianus</i> (North American opossum)	<i>Ectopistes migratorius</i> (passenger pigeon)
<i>Sylvilagus floridanus</i> (eastern cottontail)	<i>Corvus brachyrhyncho</i> (American crow)
<i>Castor canadensis</i> (American beaver)	<i>Cyanocitta cristata</i> (blue jay)
<i>Ondatra zibethicus</i> (common muskrat)	<i>Turdus migratorius</i> (American robin)
<i>Sciurus carolinensis</i> (gray squirrel)	<i>Melospiza melodia</i> (song sparrow)
<i>Tamiasciurus hudsonicus</i> (red squirrel)	<i>Spinus tristis</i> (American goldfinch)
<i>Tamias striatu</i> (eastern chipmunk)	<i>Mimus polyglottos</i> (northern mockingbird)
	<i>Progne subis</i> (purple martin)
	<i>Agelaius phoeniceus</i> (red-winged blackbird)
	<i>Accipiter cooperii</i> (Cooper's hawk)
	<i>Buteo jamaicensis</i> (red-tailed hawk)
	<i>Bubo virginianus</i> (great horned owl)
	<i>Haliaeetus leucocephalus</i> (bald eagle)
<b>Fish</b>	<b>Shellfish</b>
<i>Lepomis gibbosus</i> (pumpkinseed)	<i>Ellipsaria lineolata</i> (butterfly)
<i>Lepomis macrochiru</i> (bluegill)	<i>Truncilla truncata</i> (deer toe)
<i>Lepomis cyanellu</i> (green sunfish)	<i>Pyganodon grandis</i> (giant floater)
<i>Ambloplites rupestri</i> (rock bass)	<i>Lasmigona compressa</i> (creek heelsplitter)
<i>Micropterus</i> (largemouth and smallmouth bass)	<i>Lampsilis cardium</i> (plain pocketbook)
<i>Pomoxis nigromaculatus</i> (black crappie)	<i>Lampsilis siliquoidea</i> (fat mucket)
<i>Perca flavescens</i> (yellow perch)	<i>Lampsilis higginsii</i> (Higgins' eye)
<i>Sander viteus</i> (walleye)	<i>Quadrula metanevra</i> (monkeyface)
<i>Aplodinotus grunniens</i> (freshwater drum)	<i>Utterbackia imbecillis</i> (paper pondshell)
<i>Lepisosteus osseus</i> (longnose gar)	<i>Potamilus alatus</i> (pink heelsplitter)
<i>Ameiurus nebulosus</i> (brown bullhead)	<i>Cyclonaias tuberculata</i> (purple wartyback)
<i>Ictalurus punctatus</i> (channel catfish)	<i>Alasmidonta viridis</i> (slippershell)
Cyprinidae (shiner)	<i>Lampsilis teres</i> (slough sandshell)
<i>Ictiobus cyprinellu</i> (bigmouth buffalo)	<i>Elliptio dilatata</i> (spike)
<i>Catostomus commersonii</i> (white sucker)	<i>Amblema plicata</i> (three ridge)
<i>Esox lucius</i> (northern pike)	<i>Quadrula fragosa</i> (winged mapleleaf)
<i>Esox masquinongy</i> (muskellunge)	<i>Lampsilis teres</i> (yellow sandshell)
<b>Turtles and Frogs</b>	
<i>Chrysemys pict</i> (painted turtle)	
<i>Graptemys geographica</i> (northern map turtle)	
<i>Terrapene ornat</i> (western box turtle)	
<i>Chelydra serpentina</i> (snapping turtle)	
<i>Lithobates catesbeianu</i> (American bullfrog)	

TABLE 6.3.

## REGIONAL COMPARISON OF RELATIVE DIETARY INTAKE.

Locality/Site	Maize	EAC	Meat	Wild Rice	Nuts	References
Red Wing	High	Moderate	High	Low	Low	Pratt 1994
La Crosse	Moderate	Moderate	High	High	Moderate	Arzigian (1989, 1993)
Fox River	High	Moderate	Unknown	Low	High	Egan-Bruhy 2010b; Karsten et al. 2019
Aztalan	High	High	Unknown	Low	Low	Bender et al. 1981; Picard 2013
Koshkonong	High	Moderate	Moderate	High	High	Edwards 2017; McTavish 2019
Langford/ Northeast Illinois	High	Low	High	Low	Low	Jeske 2000; Emerson et al. 2005; Emerson et al. 2010
Fisher/Northeast Illinois	Moderate	High	Moderate	Low	Low	Hargrave et al. 2017; Egan-Bruhy and Nelson 2014
American Bottom nonelite—Flood plains	High	High	Low	Low	Low	Ambrose et al. 2003; Emerson and Hedman. 2016; Hedman 2006
American Bottom nonelite—Uplands	High	High	Low	Low	High	Hedman et al. 2002
American Bottom elite	Low	High	High	Low	Low	Ambrose et al. 2003; Emerson and Hedman 2016; Hedman 2006

similar amounts of maize and meat as did people in the American Bottom. Koshkonong Locality groups also appear to have eaten more wild rice and acorns than their southern contemporaries. In addition, Eastern Agricultural Complex (EAC) plants appear to have been less important at the Koshkonong Locality than in the American Bottom or La Crosse but more important than at northern Illinois sites (Edwards 2017; Egan-Bruhy and Nelson 2014; Olsen 2003).

There is considerable variation between Oneota localities across Wisconsin. Based on a combination of paleobotanical and stable isotope data, the La Crosse Locality occupants ate less maize and less meat than did people in most other Oneota localities, apparently using EAC plants as a major part of their diet (Edwards 2017, this volume). While there is also significant variation between sites in the American Bottom, overall, people in the La Crosse Locality ate slightly less corn, more wild rice, and much more meat than did the average person at Middle Mississippian sites in the Mississippi River valley (Arzigian 1989, 2000; Arzigian et al. 1994; Edwards 2017). People at Langford sites in northeastern Illinois ate more meat and nuts and a similar amount of corn but almost no EAC plants compared to people in the American Bottom (Edwards 2017; Egan-Bruhy and Nelson 2014; Emerson et al. 2010).

Schneider's (2015) ceramic data indicate that, while the Koshkonong Locality potters may have participated in a broad Oneota symbolic world, they were generally isolated from other Oneota potters across the physical landscape. While they shared a general recipe for paste composition and a general set of decorative motifs, they used local clays almost exclusively for vessels and the actual proportion of

Oneota motifs they shared with other Wisconsin Oneota groups was approximately 15% of those known. Moreover, the relatively high proportion of Busseyville ware at the Koshkonong Locality, and its almost complete absence elsewhere, is a strong piece of evidence that the Koshkonong Locality potters maintained an obvious distinction between their ceramic tradition and others of the same time period. What is interesting here is that the differences in symbolism cannot be attributed to local environmental variation. The production of ceramic vessel decoration demonstrates inclusiveness at a generic level of relationships with contemporaneous people across a broad landscape but also a simultaneously specific localized identity that would have been clearly evident to anyone from another locality. A similar argument has been made about shell tempering versus grit tempering at contemporaneous sites in northeastern Illinois (Jeske 2003b).

## Technology

The pattern is repeated again in lithic-resource acquisition, tool production, and tool use (Sterner 2018; Wilson 2016). Sterner (2018) shows that La Crosse Locality occupants acquired more kinds of materials, made different tool forms, and used them in different ways than did people at the Koshkonong Locality. Here again, it is not simply a case of regional variation based on localized availability. The much stronger predilection for local materials evident at Koshkonong Locality sites can only be partially explained by availability. Local sources for stone for tools are not very good. Better quality Prairie du Chien sources are approximately 40 km to the west (Ostrom 1970, 1978), and Silurian outcrops are roughly 60–70 km to the northeast (Allen 1980; Stieglitz and Allen 1980; Young and Batten 1980), but Koshkonong flintknappers did not make much of an effort to obtain them. La Crosse Locality flintknappers, however, do appear to have made the effort to get better quality cherts and materials located at long distances from their homes. Moreover, the tools that they produced and how they used them vary significantly between localities, and that suggests a complex interplay of resource utilization, subsistence, and settlement choices related to agricultural economics.

The circumscription in lithic resource acquisition distance also supports other evidence for violent encounters with neighbors (Jeske and Sterner-Miller 2015; Sterner 2018; Sterner and Jeske 2017). A similar case can be made for the patterns seen between Koshkonong Locality groups and contemporaneous Langford site occupants in northeastern Illinois (Jeske 2000, 2002; Park 2010; Wilson 2016). It is clear that all these people were following localized lithic economy strategies that can only partially be explained by adaptation to local environments. Stone tools were either not important enough in the social and economic system, or not worth the risk, to procure good-quality materials for manufacture (Jeske 2003a; Sterner 2018).

## Mortuary Patterns

Finally, mortuary data also indicate that, while Koshkonong residents may have been connected to their neighbors in the broader world, they followed a divergent path

after death (Brown et al. 1967; Foley Winkler 2011; Jeske 1927; Langford 1927; Skinner 1953). Foley Winkler (2011) and our subsequent excavations has demonstrated that the Koshkonong Locality mortuary program was highly variable and not nearly as structurally organized as seen in comparable Langford or Middle Mississippian cemeteries. Individuals were interred in pits within longhouses as well as in pits unassociated with longhouses (Jeske et al. 2013; Jeske et al. 2017). Individuals were buried in extended, flexed, and supine positions (Foley Winkler 2004; Jeske and Foley Winkler 2001). There are bundle burials at one site, multiple individuals in single graves at another, at least one ossuary at a third, and isolated bones in refuse pits at several sites (Edwards and Jeske 2016; Hall 1962; Richards et al. 1998). Only Schmeling has indications of a discrete cemetery area (Foley Winkler 2006, 2011). In sum, Koshkonong Locality burial practices are quite diverse across very close geographic distances and through a very tight time span. Recent work at the contemporaneous Hoxie and Material Service Quarry sites in northeastern Illinois supports Foley Winkler's (2011) assessment of substantial variation in mortuary practices among Oneota and Langford groups (Hargrave et al. 2017).

Taken together, along with substantial osteological evidence for interpersonal violence at contemporaneous sites across the Prairie Peninsula (Edwards and Jeske 2016; Emerson 1999; Emerson et al. 2010; Fowler 1949; Jeske et al. 2013; Jeske et al. 2017; Jeske and Sterner-Miller 2014; Karsten 2015; Langford 1927; Milner et al. 1991b; Richards and Jeske 2002; Sterner 2018; Strezewski 2006), the landscape around the Koshkonong Locality during the eleventh through fifteenth centuries appears to have been a dynamic mix of autonomous agricultural populations who were interconnected by a web of economic, social, political, and cosmological relations. Not all shared in each of these relationships equally: some seem to have been competitive, some cooperative, some accommodating, and some resistant. There does not appear to have been an overarching social framework like the Cahokia-dominated landscape generally postulated for the American Bottom and its surrounding hinterlands.

## Conclusion

The occupation of the Koshkonong Locality can now be more securely placed in the larger network of human populations living in the northern portion of the Prairie Peninsula during the eleventh through fifteenth centuries. The Oneota occupation at Lake Koshkonong lasted approximately 400 years, and people in this region were more dependent on maize, and less dependent on wild foods, than has generally been understood. In addition, the Koshkonong Locality occupants were more economically and socially independent of other contemporary groups than previously acknowledged. Ceramic, lithic, botanical, faunal, mortuary, and geo-spatial evidence suggests that they followed a set of behaviors that clearly diverged from those of contemporary populations around them. They occupied a violent world and many of their behaviors appear have been designed to mitigate risk, especially through isolation and consolidation.

This author (Jeske 1989) has previously argued that observed differences in agricultural technology and landscape utilization represent ethnic markers that differentiated Oneota and Langford ethnic identities in northern Illinois. Hunter followed suit, showing that the occupants of Oneota sites at the Koshkonong Locality used wetland resources to a greater degree than did contemporaneous Langford groups in northeast Illinois (Hunter 2002a, 2002b). These settlement decisions do not appear to have been environmentally driven. Other wild-rice producing lakes in southern Wisconsin and northern Illinois were ignored by Langford and Middle Mississippian groups, who settled in nearby riverine environments (Goldstein and Richards 1991; Jeske 1989). Taken as a whole, the last two decades of research concerning stone tool manufacture and use, subsistence, mortuary activity, and landscape utilization across the region continue to support that interpretation (e.g., Edwards 2010, 2017; Foley Winkler 2011; McTavish 2019; Moss 2010; Schneider 2015; Sterner 2018; Wilson 2016). Data from the Rock River valley in northern Illinois also conform to that interpretation (cf. Berres 2001; Jeske 2003b), as does more recent research in northeastern Illinois (Jackson 2017; Jackson and Emerson 2013).

The Oneota sites at Koshkonong provide material for rethinking a Cahokia-centric core-periphery perspective. The Koshkonong Locality cannot be seen strictly as a peripheral group bound in an economic, a political, or an ideological relationship to the American Bottom. The villages that make up that locality can, however, be seen as nodes on a network of relationships that they worked to their advantage: they maintained a defensible geographic location, had the ability to control important local resources, and apparently had the ability to sustain economic and shared cosmological relationships with other groups while keeping their own autonomy. Their boundaries were fluid—we do find some evidence for exchange or long-distance acquisition of pottery, chert, and copper (Pozza 2016, 2019). As part of a world system, they were clearly connected to the larger Prairie Peninsula and shared some symbols that relate to the American Bottom, but they also formed an entity distinct from Cahokia and from other peripheral groups. From a world-systems perspective, the Koshkonong Locality represents one of a competing set of polities that affected and were affected by multiple other polities within a bounded system. Sometimes people exchanged ideas and foods; sometimes they exchanged arrows. But the occupants of the sites discussed here highlight the variation that we see archaeologically across the uneven cultural and physical landscape of the northeastern Prairie Peninsula.

## Acknowledgments

Many thanks to all the students who provided the labor, new ideas, and new techniques that have made our progress possible. Colleagues, students, and mentors who have deeply influenced my thinking are too numerous to mention, but you know who you are. And, of course, the owners of the Crescent Bay Hunt Club, the Weisensel family, Kevin Schmeling, and other friends I have made over the last 20 years in Jefferson County are the people who made this research program possible.

## Note on Contributor

### *Robert J. Jeske*

ORCID: 0000-0002-2137-0022 – Jeske received his PhD from Northwestern University. He is a professor of anthropology at the University of Wisconsin–Milwaukee. He has interests in stone-tool technology, mortuary analysis, ethnogenesis, and social networks in the Great Lakes and midwestern United States. He also has conducted experimental and actualistic studies of the effects of canines on the archaeological record.

## References Cited

- Ahlich, Robert E., and Katherine M. Sterner-Miller (2015) The Susceptibility of Wyandotte Chert to High Power Use-Wear Analysis. Paper presented at the 59th Annual Meeting of the Midwest Archaeological Conference, Milwaukee, Wisconsin.
- Alhakimi (2002) The Extent and Boundaries of Extinct Lake Scuppernong, Jefferson County, Southeastern Wisconsin. PhD dissertation, Department of Geology, University of Wisconsin–Milwaukee, Milwaukee.
- Allen, Paula E. (1980) Paleocology and Depositional History of a Portion of the Fort Atkinson Member of the Maquoketa Formation (Upper Ordovician) in Eastern Wisconsin. Electronic document, <https://stevedutch.net/TriState80/TS80Intro.htm>, accessed April 28, 2020.
- Ambrose, Stanley H. (1987) Chemical Isotopic Techniques of Diet Reconstruction in Eastern North America. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 87–108. Center for Archaeological Investigations Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.
- Ambrose, Stanley H., Jane Buikstra, and Harold W. Krueger (2003) Status and Gender Differences in Diet at Mound 72, Cahokia, Revealed by Isotopic Analysis of Bones. *Journal of Anthropological Archaeology* 22:217–226.
- Ambrose, Stanley H., and Michael J. DeNiro (1986) The Isotopic Ecology of East African Mammals. *Oecologia* 69:395–406.
- Ambrose, Stanley H., and Lynette Norr (1993) Introduction: Are You What You Eat? In *Prehistoric Human Bone: Archaeology at the Molecular Level*, edited by Joseph B. Lambert and Gisela Grupe, pp. 1–37. Springer-Verlag, New York.
- Anderson, Adrian, Allan Westover, Terrance J. Martin, Matthew L. Murray, Susan M. T. Myster, Barbara O’Connell, and L. Anthony Zalucha (1995) The State Road Coulee Site: 47LC176. *The Wisconsin Archeologist* 76:48–230.
- Anderson, David G. (1994) *The Savannah River Chiefdoms: Political Change in the Late Prehistoric Southeast*. University of Alabama Press, Tuscaloosa.
- Arzigian, Constance (1989) The Pammel Creek Floral Remains. *The Wisconsin Archeologist* 70:111–156.
- Arzigian, Constance (1993) Analysis of Prehistoric Subsistence Strategies: A Case Study from Southwestern Wisconsin. PhD Dissertation. Department of Anthropology, University of Wisconsin–Madison.
- Arzigian, Constance (2000) Middle Woodland and Oneota Contexts for Wild Rice Exploitation in Southwestern Wisconsin. *Midcontinental Journal of Archaeology* 25:245–267.
- Arzigian, Constance M., Robert F. Boszhardt, Holly P. Halverson, and James L. Theler (1994) The Gundersen Site: An Oneota Village and Cemetery in La Crosse, Wisconsin. *Journal of the Iowa Archeological Society* 41:3–75.
- Arzigian, Constance M., Robert F. Boszhardt, James L. Theler, Roland L. Rodell, and Michael J. Scott (1989) Summary of the Pammel Creek Site Analysis and a Proposed Oneota Seasonal Round. *The Wisconsin Archeologist* 70:273–280.

- Asch, David L., and Nancy Asch Sidell (1982) A Chronological Development of Prehistoric Agriculture in West-Central Illinois. Paper presented at the 47th Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota.
- Baerreis, David A., and Reid A. Bryson (1965) Climatic Episodes and the Dating of the Mississippian Cultures. *The Wisconsin Archeologist* 46:203-220.
- Baerreis, David Albert, Reid A. Bryson, and John E. Kutzbach (1976) Climate and Culture in the Western Great Lakes Region. *Midcontinental Journal of Archaeology* 1:39-57.
- Baltus, Melissa (2014) Transforming Material Relationships: 13th Century Revitalization of Cahokia Religious Politics. PhD dissertation, Department of Anthropology, University of Illinois at Urbana-Champaign.
- Barth, Frederik, Ed. (1969) *Ethnic Groups and Boundaries*. Little, Brown, and Company, Boston.
- Benchley, Elizabeth D., Blane Nansel, Clark A. Dobbs, Susan M. Thurston Myster, and Barbara H. O'Connell (1997) *Archaeology and Bioarchaeology of the Northern Woodlands*. Research Series No. 57. Arkansas Archaeological Survey, Fayetteville.
- Benden, Danielle M. (2004) The Fisher Mounds Site Complex: Early Middle Mississippian Exploration in the Upper Mississippi Valley. *The Minnesota Archaeologist* 63:7-24.
- Bender, Margaret M., David A. Baerreis, and Raymond L. Stevenson (1981) Further Light on Carbon Isotopes and Hopewell Agriculture. *American Antiquity* 46:346-353.
- Bender, Margaret M., Reid A. Bryson, and David A. Baerreis (1970) University of Wisconsin Radiocarbon Dates VII. *Radiocarbon* 12:335-345.
- Benn, David W. (1989) Hawks, Serpents, and Bird-Men: Emergence of the Oneota Mode of Production. *Plains Anthropologist* 34:233-260.
- Benn, David W. (1995) Woodland People and the Roots of the Oneota. In *Oneota Archaeology: Past, Present, and Future*, edited by William Green, pp. 91-140. Report 20. Office of the State Archaeologist, Iowa City.
- Benn, David W., and Joe B. Thompson (2014) What Four Late Late Woodland Sites Reveal about Tribal Formation Processes in Iowa. *Illinois Archaeology* 26:1-55.
- Berres, Thomas E. (2001) *Power and Gender in Oneota Culture: A Study of a Late Prehistoric People*. Northern Illinois University Press, DeKalb.
- Bettarel, Robert L., and Hale G. Smith (1973) *The Moccasin Bluff Site and the Woodland Cultures of Southwestern Michigan*. Anthropological Papers 49. Museum of Anthropology, University of Michigan, Ann Arbor.
- Billeck, William T. (1991) Triangular Projectile Point Stages of Manufacture at the Late Woodland Sweeting Site, 13WS61. *Journal of the Iowa Archaeological Society* 38:11-15.
- Binford, Lewis R. (1967) Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning. *American Antiquity* 45:1-12.
- Binford, Lewis R. (1977) Forty-Seven Trips: A Case Study in the Character of Archaeological Formation Processes. In *Stone Tools as Cultural Markers: Change, Evolution, and Complexity*, edited by R. V. S. Wright, pp. 24-36. Australian Institute of Aboriginal Studies, Canberra.
- Binford, Lewis R. (1978) *Numamuit Ethnoarchaeology*. Academic, New York.
- Binford, Lewis R. (1980) Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.
- Birch, Jennifer, and John P. Hart (2018) Social Networks and Northern Iroquoian Confederacy Dynamics. *American Antiquity* 83:13-33.
- Bird, M. Catherine (1997) Broken Pieces: Langford Tradition Settlement System and the Role of Material Culture in the Maintenance of Social Boundaries. PhD dissertation, Department of Anthropology, University of Wisconsin-Milwaukee.
- Birmingham, Robert A. (2006) A Late 13th/Early 14th Century Oneota Component at Carcajou Point. Paper presented in symposium New Perspectives on Oneota Archaeology at Lake Koshkonong, Southeastern Wisconsin at the 50th Annual Meeting of the Midwest Archaeological Conference, Urbana, Illinois.
- Black, Robert F., Ned K. Bleuer, Francis D. Hole, Norman P. Lasca, and Louis J. Maher (1970) *Pleistocene Geology of Southern Wisconsin*. Information Circular 15. Wisconsin Geological and Natural History Survey, Madison.
- Blewitt, Rosemarie, and Mary M. King. (2017) Botanical Remains. In *The Hoxie Farm Main Occupation Area: Late Fisher and Huber Phase Occupation in South Chicago*, edited by Douglas K. Jackson, pp.

- 495–520. Research Report 40. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana–Champaign.
- Blom, Jan-Petter (1969) Ethnic and Cultural Differentiation. In *Ethnic Groups and Boundaries*, edited by Frederik Barth, pp. 74–85. Little, Brown, Boston.
- Bluhm, Elaine A., and Gloria J. Fenner (1961) The Oak Forest Site. In *Chicago Area Archaeology*, edited by Elaine A. Bluhm, pp. 139–162. Bulletin 3. Illinois Archaeological Survey, Urbana.
- Bobbie, Lisa Corinne (2012) Dene Involvement in the Fort Churchill Fur Trade Market Economy—a World Systems Theory Application. Master's thesis. Department of Anthropology, University of Manitoba, Winnipeg.
- Boszhardt, Robert F. (1994) Oneota Group Continuity at La Crosse: The Brice Prairie, Pammel Creek, and Valley View Phases. *The Wisconsin Archeologist* 75:173–236.
- Boszhardt, Robert F. (1998) Oneota Horizons: A La Crosse Perspective. *The Wisconsin Archeologist* 79:196–226.
- Boszhardt, Robert F. (2004) Blind Dates and Blind Faith: The Timeless Story of the “Emergent” Oneota McKern Phase. *The Wisconsin Archeologist* 85:3–30.
- Boszhardt, Robert F. (2012) The Effigy Mound to Oneota Revolution in the Upper Mississippi River Valley. In *The Oxford Handbook of North American Archaeology*, edited by Timothy R. Pauketat, pp. 410–421. University of Oxford Press, New York.
- Boszhardt, Robert F., and Joelle McCarthy (1999) Oneota End Scrapers and Experiments in Hide Dressing: An Analysis from the LaCrosse Locality. *Midcontinental Journal of Archaeology* 24:177–199.
- Bourdieu, Pierre (1977) *Outline of a Theory of Practice*. Cambridge University Press, New York.
- Brown, James A. (1982) What Kind of Economy Did the Oneota Have? In *Oneota Studies*, edited by Guy E. Gibbon, pp. 107–112. Publications in Anthropology Number 1. University of Minnesota, Minneapolis.
- Brown, James A., and David L. Asch (1990) Cultural Setting: The Oneota Tradition. In *At the Edge of Prehistory: Huber Phase Archaeology in the Chicago Area*, edited by James A. Brown and Patricia J. O'Brien, pp. 145–154. Center for American Archeology, Kampsville, Illinois.
- Brown, James A., and Robert F. Sasso (2001) Prelude to History on the Eastern Prairies. In *Societies in Eclipse: Archaeology of the Eastern Woodlands A.D. 1400–1700*, edited by David S. Brose, C. Wesley Cowan, and Robert C. Mainfort Jr., pp. 205–228. Smithsonian Institution Press, Washington, DC.
- Brown, James A., Roger W. Willis, Mary A. Barth, and Georg K. Neumann (1967) *The Gentleman Farm Site, LaSalle County, Illinois*. Reports of Investigations 12. Illinois State Museum, Springfield.
- Brubaker, Robert, and Lynne Goldstein (1991) Jefferson County: Archaeological Investigations at Carcajou Point in the Lake Koshkonong Region. In *The Southeastern Wisconsin Archaeology Program: 1990–91*, edited by Lynne Goldstein, pp. 35–83. Report of Investigations 107. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Brumfiel, Elizabeth M. (1996) Figurines and the Aztec State: Testing the Effectiveness of Ideological Domination. In *Gender and Archaeology*, edited by Rita P. Wright, pp. 143–163. University of Pennsylvania Press, Philadelphia.
- Buikstra, Jane E., Jerome C. Rose, and George R. Milner (1994) A Carbon Isotopic Perspective on Dietary Variation in Late Prehistoric Western Illinois. In *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 155–167. Report 19. Office of the State Archaeologist, University of Iowa, Iowa City.
- Burch, Ernest S. (2005) *Alliance and Conflict: The World System of the Inpial Eskimos*. University of Nebraska Press, Lincoln.
- Burleigh, Richard, and Don Brothwell (1978) Studies on Amerindian Dogs, 1: Carbon Isotopes in Relation to Maize in the Diet of Domestic Dogs from Early Peru and Ecuador. *Journal of Archaeological Science* 26:399–407.
- Burt, Ronald S. (1987) Social Contagion and Innovation: Cohesion versus Structural Equivalence. *American Journal of Sociology* 92:1287–1335.
- Cannon, Aubrey, Henry P. Schwarcz, and Martin Knyf (1999) Marine-Based Subsistence Trends and Stable Isotope Analysis of Dog Bones from Namu, British Columbia. *Journal of Archaeological Science* 26:399–407.
- Carpiaux, Natalie (2017) Oneota Household Dynamics at the Koshkonong Creek Village. Paper presented at the 82nd Annual Meeting of the Society for American Archaeology, Vancouver, British Columbia.

- Carpiaux, Natalie (2018) The Koshkonong Creek Village Site (47JE379): Ceramic Production, Function, and Deposition at an Oneota Occupation in Southeastern Wisconsin. Master's thesis. Department of Anthropology, University of Wisconsin-Milwaukee.
- Chase-Dunn, Christopher, and Thomas D. Hall (1991) Conceptualizing Core/Periphery Hierarchies for Comparative Studies. In *Core/Periphery Relations in Precapitalist Worlds*, edited by Christopher Chase-Dunn and Thomas D. Hall, pp. 5-43. Westview Press, Boulder.
- Clauter, Jody A. (2012) Effigy Mounds, Social Identity, and Ceramic Technology: Decorative Style, Clay Composition, and Petrography of Wisconsin Late Woodland Vessels. PhD dissertation. Department of Anthropology, University of Wisconsin-Milwaukee.
- Clinton, Jennifer M., and Tanya M. Peres (2011) Pests in the Garden: Testing the Garden-Hunting Model at the Rutherford-Kizer Site, Sumner County, Tennessee. *Tennessee Archaeology* 5:131-141.
- Cook, Robert A., and Aaron Comstock (2014) Toward More Continuous and Practical Artifact Analyses: Defining and Learning from Key Dimensions of Fort Ancient Triangular Projectile Points in the Miami Valleys. *Midcontinental Journal of Archaeology* 39:222-250.
- Deagan, Kathleen A. (1990) Accommodation and Resistance. In *Columbian Consequences: Archaeological and Historical Perspectives on the Spanish Borderlands East*, Vol. 2, edited by David H. Thomas, pp. 297-314. Smithsonian Institution Press, Washington, DC.
- Delaney-Rivera, Colleen (2004) From Edge to Frontier: Early Mississippian Occupation of the Lower Illinois River Valley. *Southeastern Archaeology* 23:41-56.
- Deloit, Richard J. (1970) *Illustrated Taxonomy Manual of Weed Seeds*. Agronomy Publications, River Falls, Wisconsin.
- Demarkar, Susan (2019) Identity Formation at the Keffer Iroquoian Village: A Relational Network Approach to Communities of Practice. PhD Dissertation. Department of Anthropology, University of Toronto, Ontario.
- Demarkar, Susan, Jennifer Birch, Termeh Shafie, John P. Hart, and Ronald F. Williamson (2016) St. Lawrence Iroquoians and Pan-Iroquoian Social Network Analysis. *Ontario Archaeology* 96:87-103.
- Depratter, Chester B. (1991) *W.P.A. Archaeological Excavations in Chatham County, Georgia: 1937-1942*. Laboratory of Archeology Series Report 29. University of Georgia, Athens.
- Doolittle, William E. (2000) *Cultivated Landscapes of Native North America*. Oxford University Press, New York.
- Doyle, Jeremy A. (2012) Living on the Edge: Chipped Stone Tool Analysis from the Koshkonong Creek Village Site (47-JE-379) in Jefferson County, Wisconsin. Paper presented at the 56th Annual Meeting of the Midwest Archaeological Conference, East Lansing, Michigan.
- Edwards, Richard W., IV (2010) Oneota Settlement Patterns around Lake Koshkonong in Southeast Wisconsin: An Environmental Catchment Analysis Using GIS Modeling. Master's thesis, Department of Anthropology, University of Wisconsin-Milwaukee.
- Edwards, Richard W., IV (2014) Digging Deep for Answers. 2014 Excavations at the Koshkonong Creek Village (47JE379). Paper presented at the 60th Annual Meeting of the Midwest Archaeological Conference, Urbana, Illinois.
- Edwards, Richard W., IV (2017) The Canine Surrogacy Approach and Paleobotany: An Analysis of Wisconsin Oneota Agricultural Production and Risk Management Strategies. PhD dissertation. Department of Anthropology, University of Wisconsin-Milwaukee.
- Edwards, Richard W., IV, and Robert Jeske (2015) Lake Koshkonong Locality's Place in the Oneota Cultural Landscape of the Lake Michigan Basin. Paper presented at the 59th Annual Meeting of the Midwest Archaeological Conference, Milwaukee, Wisconsin.
- Edwards, Richard W., IV, and Robert Jeske (2016) *Report on the Discovery of Human Remains during the 2016 Excavations at the Koshkonong Creek Village Site (47JE379), Jefferson County, Wisconsin*. Report of Investigations 454. University of Wisconsin-Milwaukee Archaeological Research Laboratory, Milwaukee.
- Edwards, Richard W., IV, Robert Jeske, and Joan Coltrain (2017) Preliminary Evidence for the Efficacy of the Canine Surrogacy Approach in the Great Lakes. *Journal of Archaeological Science: Reports* 13:516-525.
- Edwards, Richard W., IV, and Elizabeth Spott (2012) 2012 Excavations at the Koshkonong Creek Village Site. Paper Presented at the 56th Annual Meeting of the Midwest Archaeological Conference, East Lansing, Michigan.

- Egan, Kathryn C. (1988) Jehalo Site (11Gr96) Archaeobotanical Analysis. In *Report on Test Excavations at Four Sites in the Illinois and Michigan Canal National Heritage Corridor, La Salle and Grundy Counties, Illinois*, edited by Robert Jeske and John P. Hart, pp. 50–53. Northwestern Archaeological Center, Evanston, Illinois.
- Egan, Kathryn C. (1993) Floral Analysis: 1991 Excavations at the Zimmerman Site (11LS13D) LaSalle County, Illinois. Unpublished manuscript on file at the Archaeological Research Laboratory, University of Wisconsin-Milwaukee.
- Egan-Bruhy, Kathryn C. (2001a) Crescent Bay Hunt Club Floral Analysis. In *Program in Midwestern Archaeology (Southeastern Wisconsin Archaeology Program): 2000–2001*, edited by Robert J. Jeske, pp. 57–61. Report of Investigations 148. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Egan-Bruhy, Kathryn C. (2001b) Floral Analysis: Jimmy Junk (47WN-581), Muddy Meadows (47WN-618), Skeleton Bridge (47WN-126), Overton Annex (47WN-769), Overton Acres (47WN-588) and Soggy Oats (47WN-595), Winnebago County, Wisconsin. In *Archaeological Investigations along STH 110, USH 41 to CTH G*, edited by Kent Dickerson, Kari Krause, Adam Marshall, Norm M. Meinholz, Michael LaRonge, and Pat Ladwig, pp. 331–354. Research Report in Archaeology 126. Wisconsin Historical Society Museum Archaeology Program, Madison.
- Egan-Bruhy, Kathryn C. (2010a) Floral Analysis. In *Final Report: Archaeological Monitoring and Recovery of Sub-Roadbed Deposits at the Schrage Site, Calumetville, Wisconsin*, edited by Seth A. Schneider and John D. Richards, pp. 225–246. Report of Investigations 180. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Egan-Bruhy, Kathryn C. (2010b) Floral Analysis: Burley Brew (47PT159), Dambrowski (47PT160) and Blinded by the Light (47PT191). In *Phase III Data Recovery at Oneota Villages along the Waupaca/Tomorrow River in Portage County, Wisconsin: The Blinded by the Light (47PT191/BPT-0134) and Dambrowski (47PT160/47BPT137)*, edited by Kelly Hamilton, Steven R. Kuehn, Rodney Riggs, and Jason M. Kennedy, pp. 146–151. Archaeological Research Series Volume 11. Wisconsin Historical Society Museum Archaeology Program, Madison.
- Egan-Bruhy, Kathryn C. (2014) Ethnicity as Evidence in Subsistence Patterns of Late Prehistoric Upper Great Lakes Populations. *Midcontinental Journal of Archaeology Occasional Papers* 1:53–72.
- Egan-Bruhy, Kathryn C., and Jean Nelson (2010) *Crescent Bay Hunt Club Flora Table Complete Aug 16–2010*. Report submitted to Program in Midwest Archaeology, University of Wisconsin–Milwaukee. Copies available from the Program in Midwest Archaeology, University of Wisconsin–Milwaukee.
- Egan-Bruhy, Kathryn C. and Jean Nelson (2014) Floral Analysis. In *The Hoxie Farm Site Fortified Village: Late Fisher Phase Occupation and Fortification in South Chicago*, edited by Douglas K. Jackson and Thomas E. Emerson, pp. 433–446. Illinois State Archaeological Research Report 27. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana–Champaign.
- Emerson, Kjersti E., and Thomas E. Emerson (2017) Ceramics. In *The Hoxie Farm Site Fortified Village: Late Fisher Phase Occupation and Fortification in South Chicago*, edited by Douglas K. Jackson and Thomas E. Emerson, pp. 101–214. Illinois State Archaeological Research Report 27. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana–Champaign.
- Emerson, Thomas E. (1999) The Langford Tradition and the Process of Tribalization on the Middle Mississippian Borders. *Midcontinental Journal of Archaeology* 24:3–56.
- Emerson, Thomas E. (2012) Cahokia Interaction and Ethnogenesis in the Northern Midcontinent. In *The Oxford Handbook of North American Archaeology*, edited by Timothy R. Pauketat, pp. 398–409. University of Oxford Press, New York.
- Emerson, Thomas E., and James A. Brown (1992) The Late Prehistory and Protohistory of Illinois. In *Calumet and Fleur-de-Lys: Archaeology of Indian and French Contact in the Midcontinent*, edited by John A. Walthall, pp. 77–128. Smithsonian Institution, Washington, DC.
- Emerson, Thomas E., and Kristin M. Hedman (2016) The Dangers of Diversity: The Consolidation and Dissolution of Cahokia, Native North America's First Urban Polity. In *Beyond Collapse: Archaeological Perspectives on Resilience, Revitalization, and Transformation in Complex Societies*, edited by Ronald K. Faulseit, pp. 147–175. Southern Illinois University Press, Carbondale.

- Emerson, Thomas E., Kristin M. Hedman, Tamira K. Brennan, Alleen M. Betzenhauser, Susan Alt, and Timothy Pauketat (2019) Interrogating Diaspora and Movement in the Greater Cahokian World. *Journal of Archaeological Method and Theory* 26:1–18.
- Emerson, Thomas E., Kristin M. Hedman, and Mary L. Simon (2005) Marginal Horticulturalists or Maize Agriculturalists? Archaeobotanical, Paleopathological, and Isotopic Evidence Relating to Langford Tradition Maize Consumption. *Midcontinental Journal of Archaeology* 30:67–118.
- Emerson, Thomas E., Kristin M. Hedman, Robert E. Warren, and Mary L. Simon (2010) Langford Mortuary Patterns as Reflected in the Material Service Quarry Site in the Upper Illinois River Valley. *The Wisconsin Archeologist* 91:1–77.
- Emerson, Thomas E., and R. Barry Lewis, Eds. (1991) *Cabokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*. University of Illinois Press, Urbana.
- Emerson, Thomas E., and Dale L. McElrath (2001) Discontinuity and Historical Process in Midcontinental Late Archaic and Early Woodland Societies. In *The Archaeology of Traditions: Agency and History Before and After Columbus*, edited by Timothy R. Pauketat, pp. 195–217. University Press of Florida, Gainesville.
- Emerson, Thomas E., Phillip Millhouse, and Majorie B. Schroeder (2007) The Lundy Site and the Mississippiian Presence in the Apple River Valley. *The Wisconsin Archeologist* 88:1–123.
- Emerson, Thomas E., and Anne R. Titelbaum (2000) The Des Plaines Complex and the Late Woodland Stage of Northern Illinois. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 413–428. University of Nebraska Press, Lincoln.
- Ensor, Bradley E. (2009) Chipped Stone Debitage, Material Selection, and Expedient Tool Production in Southeast Michigan. *Midcontinental Journal of Archaeology* 34:199–222.
- ESRI (2013) Topographic Map, Scale 1:50,000. National Geographic Society USA Topo Map. Electronic document, <http://www.arcgis.com/home/item.html?id=99cd5fbd98934028802b4f797c4b1732>, accessed November 20, 2019.
- Farquhar, G. D., J. R. Ehleringer, and K. T. Hubick (1989) Carbon Isotope Discrimination and Photosynthesis. *Annual Review of Plant Physiology and Plant Molecular Biology* 40:503–537.
- Fenneman, N. M. (1910) *On the Lakes of Southeastern Wisconsin*. Educational Series 2. Wisconsin Geological and Natural History Survey, Madison.
- Fie, Shannon M. (2000) An Integrative Study of Ceramic Exchange during the Illinois Valley Middle Woodland Period. PhD dissertation. Department of Anthropology, State University of New York at Buffalo.
- Finney, Fred A. (2000) Exchange and Risk Management in the Upper Mississippi River Valley, AD 1000–1200. *Midcontinental Journal of Archaeology* 25:353–376.
- Fischer, Anders, and Jan Heinemeier (2003) Freshwater Reservoir Effect in <sup>14</sup>C Dates of Food Residue on Pottery. *Radiocarbon* 45:449–466.
- Fitting, James E. (1972) The Huron as an Ecotype: The Limits of Maximization in a Western Great Lakes Society. *Anthropologica* 14(1):3–18.
- Fitting, James E. (1975) Climatic Change and Cultural Frontiers in Eastern North America. *Michigan Archeologist* 21:25–39.
- Fitzgerald, William R. (1979) The Hood Site: Longhouse Burials in an Historic Neutral Village. *Ontario Archaeology* 32:43–60.
- Fleming, Edward P. (2009) Community and Aggregation in the Upper Mississippi River Valley: The Red Wing Locality. PhD dissertation. Department of Anthropology, University of Minnesota, Minneapolis.
- Foley Winkler, Kathleen M. (2004) Oneota Mortuary Practices in Southeastern Wisconsin. Master's thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Foley Winkler, Kathleen M. (2006) 2006 Excavations at the Schmeling Site (47je833). Paper presented at the 50th Annual Meeting of the Midwest Archaeological Conference, Urbana, Illinois.
- Foley Winkler, Kathleen M. (2011) Oneota and Langford Mortuary Practices in Southeastern Wisconsin and Northeast Illinois. PhD dissertation. Department of Anthropology, University of Wisconsin–Milwaukee.
- Foley Winkler, Kathleen M., and Robert J. Jeske (2003) Analysis of the Crescent Bay Hunt Club Burials. In *Lake Koshkonong 2002/2003: Archaeological Investigations at Three Sites in Jefferson County, Wisconsin*,

- edited by Robert J. Jeske, pp. 80–94. Report of Investigations 153. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Fort, Matthew A., Kristin M. Hedman, and Stanley H. Ambrose (2018) The Radiocarbon Reservoir Effect in the American Bottom. Poster presented at the 5th Illinois State Archaeological Survey's Ancient Technology and Archaeological Materials Science and Archaeology Symposium, Champaign.
- Fortier, Andrew C. (1972) Fish Bone and Scale from the Crescent Bay Hunt Club Site (47JE244), Jefferson County, Wisconsin. Master's thesis. Department of Anthropology, University of Wisconsin–Madison.
- Fowler, Melvin L. (1949) The Robinson Reserve Component: Its Cultural Affiliations and Significance. Master's thesis. Department of Anthropology, University of Chicago, Illinois.
- Fowles, Severin M., Leah Minc, Samuel Duwe, and David V. Hill (2007) Clay, Conflict, and Village Aggregation: Compositional Analyses of Pre-Classic Pottery from Taos, New Mexico. *American Antiquity* 72:125–152.
- Frank, Andre Gunder (1993) Bronze Age World System Cycles. *Current Anthropology* 34:383–432.
- Frank, Andre Gunder (1999) Abuses and Uses of World-Systems Theory in Archaeology. In *World-Systems Theory in Practice: Leadership, Production, and Exchange*, edited by P. Nick Kardulias, pp. 275–296. Rowman and Littlefield, Lanham, Maryland.
- Fritz, Gayle J. (ca. 2006) Paleoethnobotany Laboratory Guide. Department of Anthropology, Washington University, St. Louis. Electronic document, <http://pages.wustl.edu/peblabguide/table-contents>, accessed January 22, 2016.
- Fuller, Dorian Q., Chris Stevens, and Meriel McClatchie (2014) Routine Activities, Tertiary Refuse, and Labor Organization: Social Inferences from Everyday Archaeobotany. In *Ancient Plants and People: Contemporary Trends in Archaeobotany*, edited by Marco Madella, Carla Lancelotti, and Manon Savard, pp. 174–217. University of Arizona Press, Tucson.
- Gaff, Donald H. (1998) Investigations at Carcajou Point, Jefferson County. In *The Southeast Wisconsin Archaeological Project: 1997–1998*, edited by Robert J. Jeske, pp. 26–33. Report of Investigations 138. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Gallagher, Daphne E. (2014) Formation Processes of the Macrobotanical Record. In *Method and Theory in Paleoethnobotany*, edited by John M. Marston, Jade d'Alpiom Guedes, and Christina Warinner, pp. 19–34. University Press of Colorado, Boulder.
- Gallagher, James P., and Constance Arzigian (1994) A New Perspective on Late Prehistoric Agricultural Intensification in the Upper Mississippi River Valley. In *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 171–188. Report 19. Office of the State Archaeologist, University of Iowa, Iowa City.
- Gallagher, James P., Robert F. Boszhardt, Robert F. Sasso, and Katherine Stevenson (1985) Oneota Ridged Field Agriculture in Southwestern Wisconsin. *American Antiquity* 50:605–612.
- Gallagher, James P., and Katherine Stevenson (1982) Oneota Subsistence and Settlement in Southwestern Wisconsin. In *Oneota Studies*, edited by Guy E. Gibbon, pp. 15–28. Publications in Anthropology 1. University of Minnesota, Minneapolis.
- Gardner, Paul S. (1997) The Ecological Structure and Behavioral Implications of Mast Exploitation Strategies. In *People, Plants, and Landscapes: Studies in Paleoethnobotany*, edited by Kristen J. Gremillion, pp. 161–178. University of Alabama Press, Tuscaloosa.
- Geyh, Mebus A., U. Schotterer, and M. Grosjean (1998) Temporal Changes of the <sup>14</sup>C Reservoir Effect in Lakes. *Radiocarbon* 40:921–931.
- Gibbon, Guy E. (1969a) The Walker-Hooper and Bornick Sites; Two Grand River Phase Oneota Sites in Central Wisconsin. PhD dissertation. Department of Anthropology, University of Wisconsin–Madison.
- Gibbon, Guy E. (1969b) Je-244: The Crescent Bay Hunt Club Site. Notes on file, Archaeological Research Laboratory, University of Wisconsin–Milwaukee.
- Gibbon, Guy E. (1970) A Brief History of Oneota Research in Wisconsin. *The Wisconsin Magazine of History* 53:278–293.
- Gibbon, Guy E. (1971) The Bornick Site: A Grand River Phase Oneota Site in Marquette County. *The Wisconsin Archeologist* 52:85–137.
- Gibbon, Guy E. (1972a) The Walker-Hooper Site: A Grand River Phase Oneota Site in Green Lake County. *The Wisconsin Archeologist* 53:149–290.

- Gibbon, Guy E. (1972b) Cultural Dynamics and the Development of the Oneota Life-Way in Wisconsin. *American Antiquity* 37:166–185.
- Gibbon, Guy E. (1986) The Mississippian Tradition: Oneota Culture. *The Wisconsin Archeologist* 67:314–338.
- Gilbert, B. Miles (1990) *Mammalian Osteology*. Missouri Archaeological Society, Columbia.
- Gilbert, B. Miles, Larry D. Martin, and Howard G. Savage (1996) *Avian Osteology*. Missouri Archaeological Society, Columbia.
- Goatley, Daniel B. (1995) Chipped-Stone Analysis. In *The Tremaine Site*, edited by Jodie O’Gorman, pp. 145–164. Research Series Number 3. Wisconsin Historical Society Museum Archaeology Program, Archaeology, Madison.
- Goland, Carol (1993) Field Scattering as Agricultural Risk Management: A Case Study from Cuyo Cuyo, Department of Puno, Peru. *Mountain Research and Development* 13:317–338.
- Goldstein, Lynne (1979) *Report on an Archaeological Survey of Portions of the Crawfish and Rock River Valleys Near Their Confluence in Jefferson County, Wisconsin*. Report of Investigations 32. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Goldstein, Lynne (1991) The Implications of Aztalan’s Location. In *New Perspectives on Cahokia: Views from the Periphery*, edited by James B. Stoltman, pp. 209–226. University of Wisconsin Press, Madison.
- Goldstein, Lynne, and Robert Kind (1983) The Early Vegetation of the Region. In *The Southeast Wisconsin Archaeological Project: 1982–1983*, edited by Lynne Goldstein, pp. 17–45. Report of Investigations 68. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Goldstein, Lynne, and John D. Richards (1991) Ancient Aztalan: The Cultural and Ecological Context of a Late Prehistoric Site in the Midwest. In *Cahokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*, edited by Thomas E. Emerson and R. Barry Lewis, pp. 193–206. University of Illinois Press, Urbana.
- Goodby, Robert G. (1998) Technological Patterning and Social Boundaries: Ceramic Variability in Southeastern New England, AD 1000–1675. In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, pp. 171–192. Smithsonian Institution Press, Washington, DC.
- Grayson, Donald K. (1984) *Quantitative Zooarchaeology: Topics in the Analysis of Archaeological Faunas*. Academic, New York.
- Green, William (2014) Identity, Ideology, and the Effigy Mound–Oneota Transformation. *The Wisconsin Archeologist* 95:44–72.
- Griffin, James B. (1945) An Unusual Oneota Vessel from Minnesota. *American Antiquity* 11:120–121.
- Griffin, James B. (1960a) A Hypothesis for the Prehistory of the Winnebago. In *Culture in History*, edited by Stanley Diamond, pp. 809–865. Columbia University Press, New York.
- Griffin, James B. (1960b) Climatic Change: A Contributory Cause of the Growth and Decline of Northern Hopewellian Culture. *The Wisconsin Archeologist* 41:22–33.
- Griffin, James B. (1983) The Midlands. In *Ancient North Americans*, edited by Jesse D. Jennings, pp. 243–302. Freeman, New York.
- Guiry, Eric J. (2012) Dogs as Analogs in Stable Isotope-Based Human Paleodietary Reconstructions: A Review and Considerations for Future Use. *Journal of Archaeological Method and Theory* 19:354–376.
- Guiry, Eric J. (2013) A Canine Surrogacy Approach to Human Paleodietary Bone Chemistry: Past Development and Future Direction. *Archaeobiological and Anthropological Sciences* 5:275–286.
- Haaland, Gunner (1969) Economic Determinants in Ethnic Processes. In *Ethnic Groups and Boundaries*, edited by Frederik Barth, pp. 58–73. Little, Brown, Boston.
- Haas, Jennifer, Jennifer L. Picard, and Catherine Jones (2017) Skeletal Analysis for Sites 47DA0464 (BDA-0625) and 47DA1428 (BDA-0622) for the Lower Yahara River Trail Phase One Improvements, Dane County, Wisconsin. Report of Investigations 444. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Hall, Robert L. (1962) *The Archaeology of Carcajou Point*. University of Wisconsin Press, Madison.
- Hall, Robert L. (1991) Cahokia Identity and Interaction Models of Cahokia Mississippian. In *Cahokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*, edited by Thomas E. Emerson and R. Barry Lewis, pp. 3–34. University of Illinois Press, Urbana.
- Hall, Robert L. (1993) Red Banks. *The Wisconsin Archeologist* 74:10–79.

- Hall, Robert L. (1997) *The Archaeology of the Soul*. University of Illinois Press, Urbana.
- Hall, Thomas D., and Christopher Chase-Dunn (1993) The World-Systems Perspective and Archaeology: Forward into the Past. *Journal of Archaeological Research* 1:121–143.
- Halstead, Paul, and John M. O’Shea (1989) Cultural Responses to Risk and Uncertainty. In *Bad Year Economics: Cultural Responses to Risk and Uncertainty*, edited by Paul Halstead and John M. O’Shea, pp. 1–7. New Directions in Archaeology. Cambridge University Press, New York.
- Halstead, Paul, and John M. O’Shea, Eds. (1989) *Bad Year Economics*. New Directions in Archaeology. Cambridge University Press, New York.
- Hamilton, Kelly, Steven R. Huehn, Rodney Riggs, and Jason M. Kennedy (2010) *Phase III Data Recovery at Oneota Villages along the Waupaca/Tomorrow River in Portage County, Wisconsin: The Blinded by the Light (47PT191/BPT-0134) and Dambrowski (47PT160/BPT-0137)*. Archaeological Research Series Volume 11. Wisconsin Historical Society Museum Archaeology Program, Madison.
- Hanson, Paul (1996) Jefferson County: Survey of the Crescent Bay Hunt Club Property. In *Southeastern Wisconsin Archaeology Program 1995–1996*, edited by Lynne Goldstein, pp. 42–52. Report of Investigations 128. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Hargrave, Eve A., Kristin M. Hedman, Douglas K. Jackson, and Matthew A. Fort (2017) Mortuary Practices and Human Remains. In *The Hoxie Farm Main Occupation Area: Late Fisher and Huber Phase Occupation in South Chicago*, edited by Douglas K. Jackson, pp. 325–414. Research Report 40. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana–Champaign.
- Harkness, D. D., and A. Walton (1972) Further Investigations of the Transfer of Bomb <sup>14</sup>C to Man. *Nature* 240:302–303.
- Hart, John P. (1990) Modeling Oneota Agricultural Production: A Cross-Cultural Evaluation. *Current Anthropology* 31:569–577.
- Hart, John P. (1993) Monogahela Subsistence-Settlement Change: The Late Prehistoric Period in the Upper Ohio River Valley. *Journal of World Prehistory* 7:71–120.
- Hart, John P., Jennifer Birch, and Christian Gates St-Pierre (2017) Effects of Population Dispersal on Regional Signaling Networks: An Example from Northern Iroquoia. *Science Advances* 3:e1700497, accessed July 5, 2019.
- Hart, John P., and William Engelbrecht (2012) Northern Iroquoian Ethnic Evolution: A Social Network Analysis. *Journal of Archaeological Method and Theory* 19:322–349.
- Hart, John P., and William A. Lovis (2013) Reevaluating What We Know about the Histories of Maize in Northeastern North America: A Review of Current Evidence. *Journal of Archaeological Research* 21:175–216.
- Hart, John P., and William A. Lovis (2014) A Re-Evaluation of the Reliability of AMS Dates on Pottery Food Residues from the Late Prehistoric Central Plains of North America: Comment on Roper (2013). *Radiocarbon* 56:341–353.
- Hart, John P., Termeh Shafie, Jennifer Birch, Susan Dermarkar, and Ronald F. Williamson (2016) Nation Building and Social Signaling in Southern Ontario: A.D. 1350–1650. *PLoS ONE* 11:e0156178. DOI:10.1371/journal.pone.0156178, accessed May 26, 2016.
- Hart, John P., Susan Winchell-Sweeney, and Jennifer Birch (2019) An Analysis of Network Brokerage and Geographic Location in Fifteenth-Century AD Northern Iroquoia. *PLoS ONE* 14:e0209689. DOI:10.1371/journal.pone.0209689, accessed October 19 2019.
- Hatch, Mallorie Ann (2015) *The Social Costs of War: Investigating the Relationship between Warfare and Intragroup Violence during the Mississippian Period of the Central Illinois Valley*. PhD dissertation, Department of Anthropology, Arizona State University, Tempe.
- Hayden, Brian (1995) Pathways to Power: Principles for Creating Socioeconomic Inequalities. In *Foundations of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 15–86. Plenum, New York.
- Hedman, Kristin M. (2006) Late Cahokian Subsistence and Health: Stable Isotope and Dental Evidence. *Southeastern Archaeology* 25:258–274.
- Hedman, Kristin, Eve A. Hargrave, and Stanley H. Ambrose (2002) Late Mississippian Diet in the American Bottom: Stable Isotope Analyses of Bone Collagen and Apatite. *Midcontinental Journal of Archaeology* 27:237–271.
- Hegmon, Michelle (1992) Archaeological Research on Style. *Annual Review of Anthropology* 21:517–536.

- Henning, Dale R. (1995) Oneota Evolution and Interactions: A Perspective from the Wever Terrace, Southeast Iowa. In *Oneota Archaeology: Past, Present and Future*, edited by William Green, pp. 65-90. Report 20. Office of the State Archaeologist, Iowa City, Iowa.
- Henning, Dale R. (1998) Managing Oneota: A Reiteration and Testing of Contemporary Archaeological Taxonomy. *The Wisconsin Archeologist* 79:9-28.
- Heron, Carl, and Oliver E. Craig (2015) Aquatic Resources in Foodcrusts: Identification and Implication. *Radiocarbon* 57:707-719.
- Hickerson, Harold (1965) The Virginia Deer and Intertribal Buffer Zones in the Upper Mississippi Valley. In *Man, Culture, and Animals*, edited by Anthony Leeds and Andrew P. Vayda, pp. 43-66. Publication 78. American Association for the Advancement of Science, Washington, DC.
- Hillson, Simon (1986) *Teeth*. Cambridge University Press, Cambridge.
- Hinnebusch, Raymond (2011) The Middle East in the World Hierarchy: Imperialism and Resistance. *Journal of International Relations Development* 14:213-246.
- Hollinger, R. Eric (1993a) Investigating Oneota Residence through Domestic Architecture. Master's thesis. Department of Anthropology, University of Missouri, Columbia.
- Hollinger, R. Eric (1993b) Analysis of Lithics. In *The OT Site (47LC262)*, edited by Jodie O'Gorman, pp. 73-90. Archaeology Research Series Number 1. Wisconsin Historical Society Museum Archaeology Program, Madison.
- Hollinger, R. Eric (1995) Residence Patterns and Oneota Cultural Dynamics. In *Oneota Archaeology: Past, Present, and Future*, edited by William Green, pp. 141-174. Office of the State Archaeologist, University of Iowa, Iowa City.
- Hollinger, R. Eric (2005) Conflict and Culture Change in the Late Prehistoric and Early Historic American Midcontinent. PhD dissertation. Department of Anthropology, University of Illinois, Urbana-Champaign.
- Hollinger, R. Eric, and David W. Benn (1998) Oneota Taxonomy: Addressing Considerations of Time, Space, and Form. *The Wisconsin Archeologist* 79:1-8.
- Holtz, Leith, Wendy K. (2006) *Archaeological Investigations at an Oneota Village in the Heart of La Crosse, Wisconsin: Data Recovery at the Seventh Street Interchange, USH 14/61, South Avenue, Within the Sanford Archaeological District, La Crosse Wisconsin (WISDOT Project 1641-02-00/SHSW # 96-5002/LC)*. Report of Investigation 438. Mississippi Valley Archaeology Center at the University of Wisconsin-La Crosse.
- Hunter, Chrisie L. (2002a) A Comparative Study of Oneota and Langford Traditions. Master's thesis. Department of Anthropology, University of Wisconsin-Milwaukee.
- Hunter, Chrisie L. (2002b) Understanding Upper Mississippian Subsistence and Settlement through the Use of Catchment Analysis: An Oneota and Langford Perspective. *The Wisconsin Archeologist* 83:76-97.
- Hunter, Chrisie L. (2003) Blue Heron Site (47JE1001) 2003 Investigations. In *Lake Koshkonong 2002/2003: Archaeological Investigations at Three Sites in Jefferson County, Wisconsin*, edited by Robert J. Jeske, pp. 164-182. Report of Investigations 153. University of Wisconsin-Milwaukee Archaeological Research Laboratory, Milwaukee.
- Hurt, Douglas J. (1987) *Indian Agriculture in America*. University of Kansas Press, Lawrence.
- Innis, Harold A. (1930) *The Fur Trade in Canada*. Yale University Press, New Haven, Connecticut.
- Isbell, William H. (2000) What We Should Be Studying: The "Imagined Community" and the "Natural Community." In *The Archaeology of Communities: A New World Perspective*, edited by Marcello-Andrea Canuto and Jason Yaeger, pp. 243-266. Routledge, New York.
- Jackson, Douglas K., Ed. (2017) *The Hoxie Farm Site Main Occupation Area: Late Fisher and Huber Phase Components in South Chicago*. Research Report 40. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign.
- Jackson, Douglas K., and Thomas E. Emerson, Eds. (2014) *The Hoxie Farm Site Fortified Village: Late Fisher Phase Occupation and Fortification in South Chicago*. 2nd ed. Research Report 27. Illinois State Archaeological Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign.
- Jenks, Albert E. (1901) *The Wild Rice Gatherers of the Upper Lakes: A Study in American Primitive Economics*. U.S. Government Printing Office, Washington, DC.

- Jeske, John A. (1927) The Grand River Mound Group and Camp Site. *Bulletin of the Public Museum of the City of Milwaukee* 3:139–214.
- Jeske, Robert J. (1987) Efficiency, Economy and Prehistoric Lithic Assemblages in the American Midwest. PhD dissertation. Department of Anthropology, Northwestern University, Evanston, Illinois.
- Jeske, Robert J. (1989) Horticultural Technology and Social Interaction at the Edge of the Prairie Peninsula. *Illinois Archaeology* 1:103–120.
- Jeske, Robert J. (1990) Langford Tradition Subsistence, Settlement, and Technology. *Midcontinental Journal of Archaeology* 15:221–249.
- Jeske, Robert J. (1992a) Energetic Efficiency and Lithic Technology: An Upper Mississippian Example. *American Antiquity* 57:467–481.
- Jeske, Robert J. (1992b) Environment, Ethnicity, and Subsistence Change: The Late Woodland to Mississippian Transition in the Upper Midwest. *Michigan Archaeologist* 38:55–70.
- Jeske, Robert J. (1999a) Physical Setting. In *Cedar Creek Valley: A Systematic Archaeological Survey in Ozaukee and Washington Counties, Wisconsin*, edited by Robert J. Jeske, pp. 19–40. Report of Investigations 138. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Jeske, Robert J. (1999b) World Systems Theory, Core Periphery Interactions, and Elite Economic Exchange in Mississippian Societies. In *World-Systems Theory in Practice: Leadership, Production, and Exchange*, edited by P. Nick Kardulias, pp. 203–222. Rowman and Littlefield, Lanham, Maryland.
- Jeske, Robert J. (2000) The Washington Irving Site: Langford Tradition Adaptation in Northern Illinois. In *Mounds, Modoc and Mesoamerica: Essays in Honor of Melvin C. Fowler*, edited by Stephen Ahler, pp. 265–294. Scientific Papers 28. Illinois State Museum, Springfield.
- Jeske, Robert J. (2002) The Langford Occupation at the Lasalle County Home Site in the Upper Illinois River Valley. *The Wisconsin Archeologist* 83:78–22.
- Jeske, Robert J. (2003a) Lithic Raw Material Procurement and Use Within Mississippian Social Networks. In *Theory, Method and Practice in Modern Archaeology*, edited by Robert J. Jeske and Douglas K. Charles, pp. 223–237. Praeger, Westport, Connecticut.
- Jeske, Robert J. (2003b) Langford and Fisher Ceramic Traditions: Moiety, Ethnicity or Power Relations in the Upper Midwest? *The Wisconsin Archeologist* 84:165–180.
- Jeske, Robert J. (2006) Hopewell Regional Interactions in Southeastern Wisconsin and Northern Illinois: A Core-Periphery Approach. In *Re-creating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 285–309. University Press of Florida, Gainesville.
- Jeske, Robert J. (2008) Time and Space at the Crescent Bay Hunt Club. Paper presented in symposium Eastern Wisconsin Oneota: New Developments from Lake Koshkonong at the 54th Annual Meeting of the Midwest Archaeological Conference, Milwaukee, Wisconsin.
- Jeske, Robert J. (2010) Structures and Function at an Oneota Village. Paper presented at the 56th Annual Meeting of the Midwest Archaeological Conference, Bloomington, Indiana.
- Jeske, Robert J. (2014) Violence in the Wisconsin Oneota World: New Evidence from Lake Koshkonong. Paper presented at the 58th Annual Meeting of the Midwest Archaeological Conference, Urbana, Illinois.
- Jeske, Robert J., Ed. (2003) *Lake Koshkonong 2002/2003: Archaeological Investigations at Three Sites in Jefferson County, Wisconsin*. Report of Investigations 153. University of Wisconsin–Milwaukee Archaeology Research Laboratory, Milwaukee.
- Jeske, Robert J., and Richard W. Edwards IV (2014) *Report on the Discovery of Human Remains at the Koshkonong Creek Village Site (47 JE 379), Jefferson County, Wisconsin*. Report of Investigations 247. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Jeske, Robert J., Richard W. Edwards IV, Katherine M. Sterner-Miller, and Robert Ahlrichs (2015) Archaeology around Wisconsin: University of Wisconsin–Milwaukee-PIMA. *The Wisconsin Archeologist* 96:123–125.
- Jeske, Robert J., and Kathleen M. Foley Winkler (2001) Analysis of the Crescent Bay Hunt Club Burials. In *Program in Midwestern Archaeology (Southeastern Wisconsin Archaeology Program): 2000–2001*, edited by Robert J. Jeske, pp. 80–94. Report of Investigations 148. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.

- Jeske, Robert J., and Chrisie L. Hunter (2000) The Physical Setting. In *Cedar Lakes: A Systematic Archaeological Survey in Washington County, Wisconsin*, edited by Robert J. Jeske, Chrisie L. Hunter, and Seth A. Schneider, pp. 17–39. Report of Investigations 144. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Jeske, Robert J., Seth A. Schneider, Elizabeth K. Spott, and Richard W. Edwards IV (2013) Archaeology around Wisconsin: University of Wisconsin–Milwaukee–Pima. *The Wisconsin Archeologist* 94:280–281.
- Jeske, Robert J., and Katherine M. Sterner (2018) Eastern Wisconsin Oneota Longhouses. Paper presented at the 83rd Annual Meeting of the Society for American Archaeology, Washington, DC.
- Jeske, Robert J., Katherine M. Sterner, David M. Strange, Richard W. Edwards IV, and Robert E. Ahlrich (2017) *Report on the Discovery of Human Remains at the Crescent Bay Hunt Club Site (47JE904), Jefferson County, Wisconsin*. Report of Investigations 454. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Jeske, Robert J., and Katherine M. Sterner-Miller (2014) *Report on the Discovery of Human Remains at the Crescent Bay Hunt Club Site (47JE904), Jefferson County, Wisconsin*. Report of Investigations 248. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Jeske, Robert J., and Katherine M. Sterner-Miller (2015) Microwear Analysis of Bipolar Tools from the Crescent Bay Hunt Club Site (47JE904). *Lithic Technology* 40:366–376.
- Jeske, Robert J., and Daniel M. Winkler (2008) The Clovis Occupation of the Schmeling Site (47JE833) in Jefferson County, Wisconsin. *Current Research in the Pleistocene* 25:99–102.
- Jochim, Michael A. (1981) *Strategies for Survival: Cultural Behavior in an Ecological Context*. Academic, New York.
- Juel Jensen, Helle (1994) *Flint Tools and Plant Working*. Aarhus University Press, Aarhus, Denmark.
- Kardulias, P. Nick (1990) Fur Production as a Specialized Production in a World-System: Indians in North American Fur Trade. *American Indian Culture and Research Journal* 14:25–60.
- Karsten, Jordan (2015) Troubled Times in Late Prehistoric Central Wisconsin: Violent Skeletal Trauma among the Winnebago Phase Oneota. Paper presented at the 59th Annual Meeting of the Midwest Archaeological Conference, Milwaukee, Wisconsin.
- Karsten, Jordan K., Robert J. Jeske, Richard W. Edwards IV, David Strange, Kayla Kubehl, and Jeffery A. Behm (2019) Assessing Subsistence and Its Relationship to Cultural Complexity in the Late Prehistoric Upper Midwest: A New Perspective Provided by Dental Health. *American Journal of Physical Anthropology* 168:1–14.
- Keeley, Lawrence (2003) The Symbols of Warfare. *The Wisconsin Archeologist* 84:251–256.
- Keeley, Lawrence (2016) Food for War, War for Food, and War on Food. In *The Archaeology of Food and Warfare: Food Insecurity in Prehistory*, edited by Amber M. VanDerwarker and Gregory D. Wilson, pp. 291–302. Springer International, New York.
- Kelly, John Martin (2002) Delineating Spatial and Temporal Boundaries of Late Woodland Collared Wares from Wisconsin and Illinois. Master's thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Kelly, John E., Steven J. Ozuk, Douglas K. Jackson, Dale L. McElrath, Fred A. Finney, and Duane Esarey (1984) Emergent Mississippian Period. In *American Bottom Archaeology*, edited by Charles J. Bareis and James W. Porter, pp. 128–157. University of Illinois Press, Urbana.
- Kerber, Richard (1986) Political Evolution in the Lower Illinois Valley AD 400–1000. PhD dissertation, Department of Anthropology, Northwestern University, Evanston, Illinois.
- Keyes, Charles R. (1927) Prehistoric Man in Iowa. *Palimpsest* 8:215–229.
- Kipnis, Renato (2002) Long-Term Land Tenure Systems in Central Brazil: Evolutionary Ecology, Risk-Management, and Social Geography. In *Beyond Foraging and Collecting: Evolutionary Change in Hunter-Gatherer Settlement Systems*, edited by Ben Fitzhugh and Junko Habu, pp. 181–230. Springer Science and Business Media, New York.
- Knight, Dean, and Jerry Melbye (1983) Burial Patterns at the Ball Site. *Ontario Archaeology* 40:37–48.
- Kohl, Phil L. (1996) The Ancient Economy, Transferable Technologies and the Bronze Age World System: A View from the Northeastern Frontier of the Ancient Near East. In *Contemporary Archaeology in Theory*, edited by Ian Hodder and Robert W. Preucel, pp. 143–164. Blackwell, Malden, Massachusetts.

- Kolb, Michael F. (1987) Landforms and Hydrology. In *The Southeastern Wisconsin Archaeology Program: 1990-1991*, edited by Lynne Goldstein, pp. 126-129. Reports of Investigations 88. University of Wisconsin-Milwaukee Archaeological Research Laboratory, Milwaukee.
- Krus, Anthony M., John D. Richards, and Robert J. Jeske (2019) Chronology for Mississippian and Oneota Occupations at Aztalan and the Lake Koshkonong Locality. Paper presented at the 63rd Annual Meeting of the Midwest Archaeological Conference, Mankato, Minnesota.
- Kuehn, Steven (2007) Oneota Subsistence and Settlement in East-Central Wisconsin: A Reconsideration of the Grand River Phase. Paper presented in Oneota Forum in Five Sessions: Part 2 Oneota Subsistence/Settlement at the 53rd Annual Meeting of the Midwest Archaeological Conference, South Bend, Indiana.
- Kumlein, Thure L. (1877) Lake Koshkonong. In *Madison, Dane County and Surrounding Towns; Being a History and Guide*. W. J. Park, Madison, Wisconsin.
- Kuznar, Lawrence A., and Robert J. Jeske (2006) Analogic Reasoning, Ethnoarchaeology, and the Impact of Canines on the Archaeological Record. *Integrating the Diversity of Twenty-First Century Anthropology: The Life and Intellectual Legacies of Susan Kent*, edited by Christopher Pool, pp. 37-46. Archaeological Papers of the American Anthropological Association 16. American Anthropological Association, Arlington, Virginia.
- Langford, George (1927) The Fisher Mound Group, Successive Aboriginal Occupation near the Mouth of the Illinois River. *American Anthropologist* 29:153-205.
- Lapham, Increase A. (1855) *The Antiquities of Wisconsin*. Contributions to Knowledge 7. Smithsonian Institution, Washington, DC.
- Layton, Robert, and Peter Ucko, Eds. (2003) *The Archaeology and Anthropology of Landscape: Shaping Your Landscape*. Routledge, New York.
- Libby, Willard F., Rainer Berger, James F. Mead, George V. Alexander, and Joseph F. Ross (1964) Replacement Rates for Human Tissue from Atmospheric Radiocarbon. *Science* 146:1170-1172.
- Linares, Olga F. (1976) "Garden Hunting" in the American Tropics. *Human Ecology* 4:331-349.
- Lovis, William A., and John P. Hart (2015) Fishing for Dog Food: Ethnographic and Ethnohistoric Insights on the Freshwater Reservoir in Northeastern North America. *Radiocarbon* 57:557-570.
- Lulewicz, Jacob, and Adam B. Coker (2018) The Structure of the Mississippian World: A Social Network Approach to the Organization of Sociopolitical Interactions. *Journal of Anthropological Archaeology* 50:113-127.
- Lurie, Rochelle, and Robert J. Jeske (1990) Appendix 1: Lithic Recording Scheme. In *At the Edge of Prehistory: Huber Phase Archeology in the Chicago Area*, edited by James A. Brown and Patricia J. O'Brien, pp. 284-290. Center for American Archeology, Kampsville, Illinois.
- Lyman, R. Lee (1994) Quantitative Units and Terminology in Zooarchaeology. *American Antiquity* 59:36-71.
- Lyman, R. Lee (2008) *Quantitative Paleozoology*. Cambridge Manuals in Archaeology. Cambridge University Press, New York.
- McCulloch, Gretchen (2019) *Because Internet: Understanding the New Rules of Language*. Riverhead Books, New York.
- McEnaney, Katie, and Reid A. Bryson (2005) *Archaeoclimatic Models for the Milwaukee, Horicon, and Fort Atkinson Areas*. Archaeoclimatology Laboratory, Center for Climate Research, Madison, Wisconsin.
- McGimsey, Charles R., and Michael D. Conner (1985) *Deer Track: A Late Woodland Site in West-Central Illinois*. Kampsville Archeological Center Technical Report 1. Center for American Archeology, Kampsville, Illinois.
- McKern, William C. (1942) The First Settlers of Wisconsin. *The Wisconsin Magazine of History* 26:153-169.
- McKern, William C. (1945) Preliminary Report of the Upper Mississippi Phase in Wisconsin. *Bulletin of the Public Museum of the City of Milwaukee* 16:109-285.
- McKern, William C., and Robert E. Ritzenthaler (1945) Trait List of Prehistoric Wisconsin Cultures. *The Wisconsin Archeologist* 26:66-79.
- McKusick, Marshall (1974) Reconstructing the Longhouse Village Settlement Patterns. *Plains Anthropologist* 19:197-210.
- McManus, John C. (1972) An Economic Analysis of Indian Behavior in the North American Fur Trade. *Journal of Economic History* 32:36-53.

- McTavish, Rachel C. (2016) Viewshed Analyses for the Oneota Lake Koshkonong Locality: Defensibility as a Critical Variable in Settlement Studies. Paper presented at the 60th Annual Meeting of the Midwest Archaeological Conference, Iowa City, Iowa.
- McTavish, Rachel C. (2019) Foodways, Sustainability, and a Violent Landscape: A Comparative Study of Oneota and Langford Human-Animal-Environmental Relationships. PhD dissertation. Department of Anthropology, University of Wisconsin-Milwaukee.
- Madrigal, T. Cregg, and Julie Zimmerman Holt (2002) White-Tailed Deer Meat and Marrow Return Rates and Their Application to Eastern Woodlands Archaeology. *American Antiquity* 67:745-759.
- Marston, John M. (2011) Archaeological Markers of Agricultural Risk Management. *Journal of Anthropological Archaeology* 30:190-205.
- Martin, Alexander C., and William D. Barkley (1961) *Seed Identification Manual*. University of California Press, Berkeley.
- Mason, Ronald J. (1966) *Two Stratified Sites on the Door Peninsula of Wisconsin*. Anthropological Papers 26. Museum of Anthropology, University of Michigan, Ann Arbor.
- Mason, Ronald J. (1981) *Great Lakes Archaeology*. Academic, New York.
- Metcalf, Duncan, and Kevin T. Jones (1988) A Reconsideration of Body-Part Utility Indices. *American Antiquity* 53:486-504.
- Michalik, Laura K. (1982) An Ecological Perspective on the Huber Phase Subsistence-Settlement System. In *Oneota Studies*, edited by Guy E. Gibbon, pp. 29-54. University of Minnesota Publications in Anthropology Number 1. University of Minnesota, Minneapolis.
- Milner, George R. (1986) Mississippian Period Population Density in a Segment of the Central Mississippi River Valley. *American Antiquity* 51:227-238.
- Milner, George R. (1992) Morbidity, Mortality and the Adaptive Success of an Oneota Population from West-Central Illinois. In *Late Prehistoric Agriculture: Observations from the Midwest*, edited by William I. Woods, pp. 136-166. Studies in Illinois Archaeology 8. Illinois Historic Preservation Agency, Springfield.
- Milner, George R. (2007) Warfare, Population, and Food Production in Prehistoric Eastern North America. In *North American Indigenous Warfare and Ritual Violence*, edited by Richard J. Chacon and Rubén G. Mendoza, pp. 182-201. University of Arizona Press, Tucson.
- Milner, George R., Eve Anderson, and Virginia G. Smith (1991a) Conflict, Mortality, and Community Health in an Illinois Oneota Population. In *Between Bands and States*, edited by Susan A. Gregg, pp. 245-264. Center for Archaeological Investigations Occasional Paper 9. Center for Archaeological Investigations, Southern Illinois University, Carbondale.
- Milner, George R., Eve Anderson, and Virginia G. Smith (1991b) Warfare in Late-Prehistoric West Central Illinois. *American Antiquity* 56:581-603.
- Milner, George R., and Virginia G. Smith (1990) Oneota Human Skeletal Remains. In *Archaeological Investigations at the Morton Village and Norris Farms #36 Cemetery*, edited by Sharron K. Santure, Allen D. Harn, and Duane Esarey, pp. 111-148. Illinois State Museum Report of Investigations 45. Illinois State Museum, Springfield.
- Milroy, James, and Lesley Milroy (1985) Linguistic Change, Social Network and Speaker Innovation. *Journal of Linguistics* 21:339-384.
- Milroy, Lesley, and James Milroy (1992) Social Network and Social Class: Toward an Integrated Sociolinguistic Model. *Language in Society* 21:1-26.
- Mizruchi, Mark S. (1994) Social Network Analysis: Recent Achievements and Current Controversies. *Acta Sociologica* 37:329-343.
- Montgomery, Frederick H. (1977) *Seeds and Fruits of Plants of Eastern Canada and Northeastern United States*. University of Toronto Press, Toronto, Ontario.
- Moore, Kaitlyn Ann (2012) Negotiating the Middle Ground in a World-System: The Nüsitapi (Blackfoot) and Ktunaxa (Kootenai) in the Northern Rocky Mountain Fur Trade. Master's thesis. Department of Anthropology, University of Arizona, Tucson.
- Moss, James D. (2010) Intrasite Feature Analysis of the Crescent Bay Hunt Club Site (47JE904), an Oneota Site in Southeastern Wisconsin. Master's thesis. Department of Anthropology, University of Wisconsin-Milwaukee.

- Mudrey, M. G., Jr., B. A. Brown, and J. K. Greenburg (1982) *Bedrock Geologic Map of Wisconsin*. University of Wisconsin-Extension Geological and Natural History Survey, Madison.
- Musil, Jennifer L. (1987) The Lake Koshkonong Region: Survey and Effigy Mound Research. In *The Southeast Wisconsin Archaeology Project: 1986-87 and Project Summary*, edited by Lynne Goldstein, pp. 122-150. Report of Investigations 88. University of Wisconsin-Milwaukee Archaeology Research Laboratory, Milwaukee.
- Nass, John P. (1987) Use-Wear Analysis and Household Archaeology: A Study of the Activity Structure of the Incinerator Site, an Anderson Phase Fort Ancient Community in Southwestern Ohio. PhD dissertation. Department of Anthropology, Ohio State University, Columbus.
- Nassaney, Michael S. (2015) *The Archaeology of the North American Fur Trade*. University Press of Florida, Gainesville.
- Netting, Robert M. (1986) *Cultural Ecology*. 2nd ed. Waveland, Prospect Heights, Illinois.
- Norton, Alexandra (n.d.) *A Preliminary Analysis of the Schmeling Lithics*. Unpublished manuscript on file at the Archaeological Research Laboratory, University of Wisconsin-Milwaukee.
- Oemig, Alexandria M., and Jordan K. Karsten (2016) Troubled Times in Late Prehistoric Wisconsin: Violent Skeletal Trauma among the Winnebago Phase Oneota. Paper presented at the 85th Annual Meeting of the American Association of Physical Anthropologists, Atlanta, Georgia.
- O’Gorman, Jodie A. (2010) Exploring the Longhouse and Community in Tribal Society. *American Antiquity* 57:571-597.
- O’Gorman, Jodie A., Ed. (1993) *The Tremaine Site Complex: Oneota Occupation in the La Crosse Locality Wisconsin: The OT Site (47 Lc-262)*. Archaeology Research Series 1. Wisconsin Historical Society Museum Archaeology Program, Madison.
- O’Gorman, Jodie A., Ed. (1994) *The Tremaine Site Complex: Oneota Occupation in the La Crosse Locality Wisconsin: The Filler Site: (47Lc-149)*. Archaeology Research Series 2. Wisconsin Historical Society Museum Archaeology Program, Madison.
- O’Gorman, Jodie A., Ed. (1995) *The Tremaine Site Complex: Oneota Occupation in the La Crosse Locality Wisconsin: The Tremaine Site (47 LC-95)*. Archaeology Research Series 3. Wisconsin Historical Society Museum Archaeology Program, Madison.
- Olsen, M. Lee (2003) Agriculture, Domestication and Oneota Subsistence in Southern Wisconsin: The Crescent Bay Hunt Club Site. Master’s thesis. Department of Anthropology, University of Wisconsin-Milwaukee.
- Olsen, Stanley J. (1968) *Fish, Amphibian, and Reptile Remains from Archaeological Sites*. Peabody Museum, Cambridge, Massachusetts.
- Olsen, Stanley J. (1979) *Osteology for the Archaeologist*. Peabody Museum, Cambridge, Massachusetts.
- O’Shea, John M. (1989) The Role of Wild Resources in Small-Scale Agricultural Systems: Tales from the Lakes and the Plains. In *Bad Year Economics: Cultural Responses to Risk and Uncertainty*, edited by Paul Halstead and John M. O’Shea, pp. 57-67. Cambridge University Press, New York.
- Ostrom, Meredith E., Ed. (1970) *Field Trip Guide Book for Cambrian-Ordovician Geology of Western Wisconsin*. Information Circular 11. University of Wisconsin-Extension, Geological and Natural History Survey, Madison.
- Ostrom, Meredith E., Ed. (1978) *Lithostratigraphy, Petrology, and Sedimentology of Late Cambrian-Early Ordovician Rocks near Madison, Wisconsin*. Field Trip Guide Book 3. University of Wisconsin-Extension, Geological and Natural History Survey, Madison.
- Overstreet, David F. (1976) The Grand River, Lake Koshkonong, Green Bay, and Lake Winnebago Phases: Eight Hundred Years of Oneota Prehistory in Eastern Wisconsin. PhD dissertation. Department of Anthropology, University of Wisconsin-Milwaukee.
- Overstreet, David F. (1978) Oneota Settlement Patterns in Eastern Wisconsin: Some Considerations of Time and Space. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 21-52. Academic, New York.
- Overstreet, David F. (1981) Investigations at the Pipe Site (47FD10): Some Perspectives on Eastern Wisconsin Oneota Prehistory. *The Wisconsin Archeologist* 62:365-535.
- Overstreet, David F. (1995) The Eastern Wisconsin Oneota Regional Continuity. In *Oneota Archaeology Past, Present, and Future*, edited by William Green, pp. 33-64. Report 20. Office of the State Archaeologist, University of Iowa, Iowa City.

- Overstreet, David F. (1997) Oneota Prehistory and History. *The Wisconsin Archeologist* 78:250–297.
- Overstreet, David F. (2000) Cultural Dynamics of the Late Prehistoric Period in Southern Wisconsin. In *Mounds, Modoc, and Mesoamerica: Papers in Honor of Melvin L. Fowler*, edited by Melvin L. Fowler and Steven R. Ahler, pp. 405–438. Scientific Papers 28. Illinois State Museum, Springfield.
- Overstreet, David F. (2001) Dreaded Dolostone and Old Smudge Stories—a Response to Critiques of Emergent Oneota <sup>14</sup>C Dates from Eastern Wisconsin. *The Wisconsin Archeologist* 82:33–86.
- Overstreet, David F. (2009) The Mero Complex and the Menominee Tribe—Prospects of a Territorial Ethnicity. *The Wisconsin Archeologist* 90:179–224.
- Painter, Jeffrey M., and Jodie A. O’Gorman (2019) Cooking and Community: An Exploration of Oneota Group Variability through Foodways. *Midcontinental Journal of Archaeology* 44:231–258.
- Park, Sung Woo (2004) Lithic Technology and Subsistence Change in the Thirteenth through Seventeenth Centuries: An Example from the Zimmerman/Grand Village of Kaskaskia Site in the Upper Illinois River Valley. PhD dissertation. University of Wisconsin–Milwaukee.
- Park, Sung Woo (2010) Subsistence Change and Lithic Technological Response by Late Prehistoric and Historic Occupants of the Zimmerman Site (11S13) in the Upper Illinois River Valley of Northern Illinois. *The Wisconsin Archeologist* 91:81–102.
- Parry, William J., and Robert L. Kelly (1987) Expedient Core Technology and Sedentism. In *The Organization of Core Technology*, edited by Jay K. Johnson and Carol A. Morrow, pp. 285–304. Westview Press, Boulder.
- Pauketat, Timothy R., Robert F. Boszhardt, and Danielle M. Benden (2015) Trempealeau Entanglements: An Ancient Colony’s Causes and Effects. *American Antiquity* 80:260–289.
- Pearsall, Deborah M. (1988) Interpreting the Meaning of Macroremain Abundance: The Impact of Source and Context. In *Current Paleoethnobotany: Analytical Methods and Cultural Interpretations of Plant Remains*, edited by Christine A. Hastorf and Virginia S. Popper, pp. 97–118. University of Chicago Press, Chicago.
- Pearsall, Deborah M. (2010) *Paleoethnobotany*. 2nd ed. Left Coast Press, Walnut Creek, California.
- Peregrine, Peter (1991a) Prehistoric Chiefdoms on the American Midcontinent: A World-System Based on Prestige Goods. In *Core/Periphery Relations in Precapitalist Worlds*, edited by Christopher Chase-Dunn and Thomas D. Hall, pp. 193–211. Westview Press, Boulder.
- Peregrine, Peter (1991b) *Mississippian Evolution: A World-System Perspective*. Prehistory Press, Madison, Wisconsin.
- Peske, G. Richard (1966) Oneota Settlement Patterns and Agricultural Patterns in Winnebago County. *The Wisconsin Archeologist* 47:190.
- Philippsen, Bente (2013) The Freshwater Reservoir Effect in Radiocarbon Dating. *Heritage Science* 1:24. DOI:10.1186/2050-7445-1-24, accessed October 27, 2019.
- Picard, Jennifer L. (2013) Northern Flint, Southern Roots: A Diachronic Analysis of Paleoethnobotanical Remains and Maize Race at the Aztalan Site (47-Je-0001). Master’s thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Picard, Jennifer L., Jeremy A. Doyle, Rachel C. McTavish, and Jennifer R. Haas (2018) *Lower Yahara River Trail Reports of Investigations: II. Archaeological Investigations within Site 47da1428 (Bda-0622)*. Report of Investigations 501. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Pope, Melody K. (2005) Chipped Stone, Tools, and Towns: An Archaeological Study of Uruk Period Lithic Production and Use at Abu Salabikh, Iraq. PhD dissertation. Department of Anthropology, University of Binghamton, New York.
- Popper, Virginia S. (1988) Selecting Quantitative Measurements in Paleoethnobotany. In *Current Paleoethnobotany: Analytical Methods and Cultural Interpretations of Plant Remains*, edited by Christine A. Hastorf and Virginia S. Popper, pp. 53–71. University of Chicago Press, Chicago.
- Pozza, Jacqueline M. (2016) Investigating the Functions of Copper Material Culture from Four Oneota Sites of the Lake Koshkonong Region. Master’s thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Pozza, Jacqueline M. (2019) Approaching a Vast and Varied Copper Collection: An Analysis of Oneota Copper Artifacts of the Lake Koshkonong Region in Southeastern Wisconsin. *Journal of Archaeological Science: Reports* 25:632–647.

- Pratt, Daniel R. (1994) A Carbon Isotope Analysis of Fifty-Nine Burials from the Upper Mississippi River Valley. Master's thesis. Department of Anthropology, University of Minnesota, Minneapolis.
- Radin, Paul (1923) *The Winnebago Tribe*. Thirty-Seventh Annual Report of the Bureau of American Ethnology. Smithsonian Institute, Washington, DC.
- Redmond, Brian G., and Robert G. McCullough (2000) The Late Woodland to Late Prehistoric Occupations in Central Indiana. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 643–683. University of Nebraska Press, Lincoln.
- Reitz, Elizabeth J., Irvy R. Quitmyer, H. Stephen Hale, Sylvia J. Scudder, and Elizabeth S. Wing (1987) Application of Allometry to Zooarchaeology. *American Antiquity* 52:304–317.
- Renfrew, Colin (1996) Peer Polity Interaction and Socio-Political Change. In *Contemporary Archaeology in Theory*, edited by Ian Hodder and Robert W. Preucel, pp. 114–142. Blackwell, Malden, Massachusetts.
- Rice, Prudence M. (2015) *Pottery Analysis: A Source Book*. 2nd ed. University of Chicago Press, Chicago.
- Richards, John D. (1992) Ceramics and Culture at Aztalan, a Late Prehistoric Village in Southeast Wisconsin. PhD dissertation. Department of Anthropology, University of Wisconsin–Milwaukee.
- Richard, John D. (2010) Introduction. In *Archaeological Monitoring and Recovery of Sub-Roadbed Deposits at the Schrage Site, Calumetville, Wisconsin*, edited by Seth A. Schneider and John D. Richards, pp. 1–10. Report of Investigations 180. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Richards, John D., and Robert J. Jeske (2002) Location, Location, Location: The Temporal and Culture Context of Late Prehistoric Settlement in Southeast Wisconsin. *The Wisconsin Archeologist* 83:32–54.
- Richards, John D. and Robert J. Jeske (2015) *Preliminary Results of Accelerator Mass Spectrometry Dating of Food Residues on Prehistoric Ceramics from the Western Great Lakes and Prairie Peninsula Regions of the Midcontinent*. Report of Investigation 370. University of Wisconsin–Milwaukee Archaeological Research Laboratory Milwaukee.
- Richards, John D., Patricia B. Richards, and Brian D. Nicholls (1998) *Archaeological Investigations in the Carcajou Point Locale, Summer Township, Jefferson County, Wisconsin*. Report of Investigations 129. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Richards, John D., and Seth A. Schneider (2008) Comparative Compositional Analysis of Woodland and Mississippian Sherds from the Aztalan Site. Paper presented at the 73rd Annual Meeting of the Society for American Archaeology, Vancouver, British Columbia.
- Richards, John D., Seth A. Schneider, and Timothy R. Pauketat (2010) Comparative Analysis of Red-and-White Pottery from Cahokia and Aztalan. Paper presented at the 75th Annual Meeting of the Society for American Archaeology, St. Louis, Missouri.
- Riggs, Rodney, Jason M. Kennedy, and Steven R. Kuehn (2009) *The Burley Brew (47PT159/BPT-0133) Site, Phase III Data Recovery at an Oneota Village in Portage County, Wisconsin*. Research Report in Archaeology 12. Wisconsin Historical Society, Madison.
- Robertson, James A. (1984) Chipped Stone and Functional Interpretations: A Fort Ancient Example. *Midcontinental Journal of Archaeology* 9:251–267.
- Rodell, Roland L. (1983) The Late Prehistory of Eastern Wisconsin: A Survey of the Archaeological Research and Interpretations Pertaining to Oneota Settlement and Subsistence. Master's thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Rodell, Roland L. (1984) A Survey of Oneota Sites in the Lake Koshkonong Area. In *Southeast Wisconsin Archaeology Project: 1983–1984*, edited by Lynne Goldstein, pp. 144–166. Report of Investigations 77. University of Wisconsin–Milwaukee Archaeology Research Laboratory, Milwaukee.
- Rodell, Roland L. (1987) Oneota Research. In *The Southeast Wisconsin Archaeological Project: 1986–87 and Project Summary*, edited by Lynne Goldstein, pp. 190–199. Report of Investigations 88. University of Wisconsin–Milwaukee Archaeological Research Laboratory, Milwaukee.
- Rodell, Roland L. (1989) The Pammel Creek Site Lithic Artifacts. *The Wisconsin Archeologist* 70:95–110.
- Rodell, Roland L. (1997) The Diamond Bluff Site Complex: Time and Tradition in the Northern Mississippi Valley. PhD dissertation. Department of Anthropology, University of Wisconsin–Milwaukee.

- Romond, Sara, Kathleen M. Foley Winkler, Robert J. Jeske, Daniel M. Winkler, Kristin Hedman, Phil Slater, and Matthew Fort (2011) Late Archaic Lifeways in Southeastern Wisconsin: Evidence from the Jaco Site (47JE1192). Paper presented at the 58th Annual Meeting of the Midwest Archaeological Conference, La Crosse, Wisconsin.
- Roper, Donna C. (2013) Evaluating the Reliability of AMS Dates on Food Residue on Pottery from the Late Prehistoric Central Plains of North America. *Radiocarbon* 55:151-162.
- Roper, Donna C. (2014) A Response to Hart and Lovis. *Radiocarbon* 56:355-359.
- Roper, Donna C., and Mary J. Adair (2012) Additional AMS Radiocarbon Age Determinations for the Central Plains Tradition. *Plains Anthropologist* 57:31-38.
- Rosebrough, Amy L. (2010) Every Family a Nation: A Deconstruction and Reconstruction of the Effigy Mound 'Culture' of the Western Great Lakes of North America. PhD dissertation. Department of Anthropology, University of Wisconsin-Madison.
- Rosebrough, Amy L., and John H. Broihahn (2005) *A Conundrum at Carcajou Point*. Technical Report Series 05-0002. Office of the State Archaeologist, Wisconsin Historical Society, Madison.
- Rotman, Deborah L., and Agustín Fuentes (2016) Mormon and Irish Landscapes on Beaver Island, Lake Michigan—Niche Construction and Socio-Ecological Inheritance in the Nineteenth Century. *Landscapes* 17:62-81.
- Ruby, Bret J., Christopher Carr, and Douglas K. Charles (2005) Community Organization in the Scioto, Mann, and Havana Hopewellian Regions: A Comparative Perspective. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 119-176. Springer, New York.
- Ryan, Bryce, and Neal C. Gross (1943) The Diffusion of Hybrid Seed Corn in Two Iowa Communities. *Rural Sociology* 8:15-24.
- Sackett, James R. (1977) The Meaning of Style: A General Model. *American Antiquity* 42:369-380.
- Salkin, Philip H. (2000) The Horicon and Kekoskee Cultural Complexes in the Late Woodland Stage in Southeastern Wisconsin. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 525-542. University of Nebraska Press, Lincoln.
- Sandstrom, Alan R. (1991) *Corn Is Our Blood: Culture and Ethnic Identity in a Contemporary Aztec Village*. Oklahoma University Press, Norman.
- Sasso, Robert F. (1989) Oneota Settlement Practices in the La Crosse Region: An Analysis of the Coon Creek Drainage in the Driftless Area of Western Wisconsin. PhD dissertation. Department of Anthropology, Northwestern University, Evanston, Illinois.
- Sasso, Robert F. (2001) Observations on the Oneota Cultivation Sites in Winnebago County *The Wisconsin Archeologist* 82:125-138.
- Sasso, Robert F. (2003) Agricultural Places and the Oneota Lifeway in Wisconsin. In *Theory, Method, and Practice in Modern Archaeology*, edited by Robert J. Jeske and Douglas K. Charles, pp. 252-265. Praeger, Westport, Connecticut.
- Schirmer, Ronald C. (2002) Plant-Use Systems and Late Prehistoric Culture Change in the Red Wing Locality. PhD dissertation. Department of Anthropology, University of Minnesota, Minneapolis.
- Schneider, Seth A. (2015) Oneota Ceramic Production and Exchange: Social, Economic, and Political Interactions in Eastern Wisconsin between AD 1050-1400. PhD dissertation. Department of Anthropology, University of Wisconsin-Milwaukee.
- Schneider, Seth A., and John D. Richards (2011) Ceramic Analysis. In *Final Report: Archaeological Monitoring and Recovery of Sub-Roadbed Deposits at the Schrage Site, Calumetville, WI*, edited by Seth A. Schneider and John D. Richards, pp. 151-180. Report of Investigations 180. University of Wisconsin-Milwaukee Archaeological Research Laboratory, Milwaukee.
- Schoeller, Dale A. (1999) Isotope Fractionation: Why Aren't We What We Eat? *Journal of Archaeological Science* 26:667-673.
- Schroeder, Sissel (1999) Maize Productivity in the Eastern Woodlands and Great Plains of North America. *American Antiquity* 64:499-516.

- Schroeder, Sissel (2002) 2001 *Investigations at the Skare Site (47 Da 96)*. Report of Investigations 1. Wisconsin Archaeological Laboratory, University of Wisconsin–Madison.
- Schroeder, Sissel (2007) Evidence for Paleoindians in Wisconsin and at the Skare Site. *Plains Anthropologist* 52:63–91.
- Scott, John (2011) Social Network Analysis: Developments, Advances, and Prospects. *Social Network Analysis and Mining* 1:21–26
- Shott, Michael J. (1992) Radiocarbon Dating as a Probabilistic Technique: The Childers Site and Late Woodland Occupation in the Ohio Valley. *American Antiquity* 57:202–230.
- Simon, Mary L. (2000) Regional Variations in Plant Use Strategies in the Midwest during the Late Woodland. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 37–75. University of Nebraska Press, Lincoln.
- Skinner, Robert R. (1953) The Oakwood Mound, an Upper Mississippian Component. *Journal of the Illinois State Archaeological Society* 31:2–14.
- Slater, Philip A., Kristin M. Hedman, and Thomas E. Emerson (2014) Immigrants at the Mississippian Polity of Cahokia: Strontium Isotope Evidence for Population Movement. *Journal of Archaeological Science* 44:117–127.
- Smith, Wallis (1973) The Fur Trade and the Frontier: A Study of an Inter-Cultural Alliance. *Anthropologica* 15:21–35.
- Snow, Dean R. (2007) Iroquois-Huron Warfare. In *North American Indigenous Warfare and Ritual Violence*, edited by Richard J. Chacon and Rubén G. Mendoza, pp. 149–159. University of Arizona Press, Tucson.
- Soil Survey Staff, National Resource Conservation Service, U.S. Department of Agriculture (2017) Web Soil Survey. United States Department of Agriculture: Natural Resource Conservation Service. Electronic document, <https://websoilsurvey.sc.egov.usda.gov/?referrer=Citation.htm-HomeLink1>, accessed February 25, 2017.
- Speck, Frank G., and Loren C. Easley (1939) Significance of Hunting Territory Systems of the Algonkian in Social Theory. *American Anthropologist* 41:269–280.
- Spector, Janet (1975) Crabapple Point (Je93): An Historic Winnebago Indian Site in Jefferson County, Wisconsin. *The Wisconsin Archeologist* 56:270–345.
- Spott, Elizabeth K. (2012) Ground Truthing Site Inventory Data: An Example from Lake Koshkonong, Jefferson County, Wisconsin. Paper presented at the 66th Annual Meeting of the Midwest Archaeological Conference, East Lansing, Michigan.
- Staeck, John (1994) Archaeology, Identity, and Oral Tradition: A Reconsideration of Late Prehistoric and Early Historic Winnebago Social Structure and Identity as Seen through Oral Traditions. PhD dissertation. Department of Anthropology, Rutgers University, New Brunswick, New Jersey.
- Stark, Miriam T. (1999) Social Dimensions of Technical Choice in Kalinga Ceramic Traditions. In *Material Meaning: Critical Approaches to the Interpretation of Material Culture*, edited by Elizabeth S. Chilton, pp. 24–43. University of Utah Press, Salt Lake City.
- Stevenson, Katherine P., Robert F. Boszhardt, Charles R. Moffat, Philip H. Salkin, Thomas C. Pleger, James L. Theler, and Constance M. Arzigian (1997) The Woodland Tradition. *The Wisconsin Archeologist* 78:140–201.
- Stein, Gil J. (1999) Rethinking World-Systems: Power, Distance, and Diasporas in the Dynamics of Interregional Interaction. In *World-Systems Theory in Practice: Leadership, Production, and Exchange*, edited by P. Nick Kardulias, pp. 153–178. Rowman and Littlefield, Lanham, Maryland.
- Stein, Gil J. (2002) From Passive Periphery to Active Agents: Emerging Perspectives in the Archaeology of Interregional Interaction. *American Anthropologist* 104:903–916.
- Stenhouse, M. J., and M. S. Baxter (1977) Bomb <sup>14</sup>C as a Biological Tracer. *Nature* 267:828–832.
- Stenhouse, M. J., and M. S. Baxter (1979) The Uptake of Bomb <sup>14</sup>C in Humans. In *Radiocarbon Dating*, edited by Ranier Berger and Hans E. Suess, pp. 324–341. University of California Press, Berkeley.
- Sterner, Katherine M. (2018) Stone Tools and Agricultural Communities: Economic, Microwear, and Residue Analyses of Wisconsin Oneota Lithic Assemblages. PhD dissertation. Department of Anthropology, University of Wisconsin–Milwaukee.
- Sterner, Katherine M., and Robert J. Jeske (2017) A Multi-Method Approach to Inferring Early Agriculturalists' Stone Tool Use at the Crescent Bay Hunt Club Site. *Midcontinental Journal of Archaeology* 42:1–27.

- Sterner-Miller, Katherine M. (2014) Another Piece of the Puzzle: Ongoing Excavations at the Crescent Bay Hunt Club Oneota Site (47Je904). Paper presented at the 60th Annual Meeting of the Midwest Archaeological Conference, Champaign, Illinois.
- Sterner-Miller, Katherine M., Robert J. Jeske, and Robert E. Ahlrichs (2015) Understanding Oneota Stone Tool Functions: A Case Study of Precision and Accuracy in Use-Wear Analysis. Paper presented at the 80th Annual Meeting of the Society for American Archaeology, San Francisco, California.
- Stieglitz, Ronald D., and Paula E. Allen (1980) Upper Ordovician and Lower Silurian Strata of Eastern Wisconsin. Electronic document, <https://stevedutch.net/TriState80/TS80Intro.htm>, accessed April 28, 2020.
- Stoltman, James B., Ed. (1991) *New Perspectives on Cahokia: Views from the Periphery*. Prehistory Press, Madison, Wisconsin.
- Stoltman, James B. (1989) A Quantitative Approach to the Petrographic Analysis of Ceramic Thin Sections. *American Antiquity* 54:147-160.
- Stoltman, James B. (1991a) Ceramic Petrography as a Technique for Documenting Cultural Interaction: An Example from the Upper Mississippi Valley. *American Antiquity* 56:103-120.
- Stoltman, James B. (1991b) Cahokia as Seen from the Peripheries. In *New Perspectives on Cahokia: Views from the Periphery*, edited by James B. Stoltman, pp. 349-353. Prehistory Press, Madison, Wisconsin.
- Stoltman, James B. (2000) A Reconsideration of the Cultural Processes Linking Cahokia to Its Northern Hinterlands during the Period A.D. 1000-1200. In *Mounds, Modoc, and Mesoamerica: Papers in Honor of Melvin L. Fowler*, edited by Stephen Ahler, pp. 439-454. Scientific Papers 28. Illinois State Museum, Springfield.
- Stoltman, James B., Danielle M. Benden, and Robert F. Boszhardt (2008) New Evidence in the Upper Mississippi Valley for Pre-Mississippian Cultural Interaction with the American Bottom. *American Antiquity* 73:317-336.
- Stoltman, James B. and George W. Christiansen (2000) The Late Woodland Stage in the Driftless Area of the Upper Mississippi Valley. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 497-524. University of Nebraska Press, Lincoln.
- Stoltman, James B., and Robert C. Mainfort Jr. (2002) Minerals and Elements: Using Petrography to Reconsider the Findings of Neutron Activation in the Compositional Analysis of Ceramics from Pinson Mounds, Tennessee. *Midcontinental Journal of Archaeology* 27:1-34.
- Stoltman, James B., Joyce Marcus, Kent V. Flannery, James H. Burton, and Robert G. Moyle (2005) Petrographic Evidence Shows That Pottery Exchange Between the Olmec and Their Neighbors Was Two-Way. *Proceedings of the National Academy of Sciences of the United States of America* 102:11213-11218.
- Stout, Arlow B., and Halvor T. Skavlem (1908) The Archaeology of the Lake Koshkonong Region. *The Wisconsin Archeologist* 7:47-102.
- Strezewski, Michael (2006) Patterns of Interpersonal Violence at the Fisher Site. *Midcontinental Journal of Archaeology* 31:249-280.
- Stuiver, M., Reimer, P. J., and Reimer, R.W. (2020) CALIB 7.1 [WWW program] at <http://calib.org>, accessed March 27, 2020.
- Styles, Bonnie W., and Karli White (1995) Analysis of Faunal Remains. In *The Tremaine Site (47Lc-95)*, edited by Jodie O'Gorman, pp. 197-224. State Historical Society of Wisconsin, Madison.
- Tankersley, Kenneth B., Denis G. Conover, and David L. Lentz (2016) Stable Carbon Isotope Values (<sup>13</sup>C) of Purslane (*Portulaca oleracea*) and Their Archaeological Significance. *Journal of Archaeological Science: Reports* 7:189-194.
- Tankersley, Kenneth B., and Jeremy M. Koster (2009) Sources of Stable Isotope Variation in Archaeological Dog Remains. *North American Archaeologist* 30:361-375.
- Toll, Mollie S. (1988) Flotation Sampling: Problems and Some Solutions, with Examples from the American Southwest. In *Current Paleoethnobotany: Analytical Methods and Cultural Interpretations of Plant Remains*, edited by Christine A. Hastorf and Virginia S. Popper, pp. 36-52. University of Chicago Press, Chicago.
- Trelease, Allen W. (1962) The Iroquois and the Western Fur Trade: A Problem in Interpretation. *The Mississippi Valley Historical Review* 49:32-51.

- U.S. Department of Agriculture, Agriculture Research Service (2017) USDA National Nutrient Database for Standard Reference. Electronic document, <https://www.ars.usda.gov/northeast-area/beltsville-md-bhnrc/beltsville-human-nutrition-research-center/nutrient-data-laboratory/docs/usda-national-nutrient-database-for-standard-reference/>, accessed August 10, 2017.
- Vander Heiden, Robert W., Jr., and John D. Richards (2015) Late Woodland and Middle Mississippian Stone Tool Use at the Aztalan Site: A Comparative Lithic Analysis. Paper presented at the 59th Annual Meeting of the Midwest Archaeological Conference, Milwaukee, Wisconsin.
- VanDerwarker, Amber M., and Gregory D. Wilson (2016) War, Food, and Structural Violence in the Mississippian Central Illinois Valley. In *The Archaeology of Food and Warfare: Food Insecurity in Prehistory*, edited by Amber M. VanDerwarker and Gregory D. Wilson, pp. 75–105. Springer, New York.
- Vennum, Thomas, Jr. (1988) *Wild Rice and the Ojibway People*. Minnesota Historical Society Press, St. Paul.
- Vradenburg, Joseph A. (1994) Analysis of Lithics. In *The Filler Site (47LC149)*, edited by Jodie O’Gorman, pp. 63–82. Research Series Number 2. Wisconsin Historical Society Museum Archaeology Program, Archaeology, Madison.
- Wallerstein, Immanuel (1974) *The Modern World-System I*. Academic, New York.
- Wallis, Neill J. (2006) The Case for Swift Creek Paddles as Totemic Symbols: Some Anthropological Considerations. *Florida Anthropologist* 59:55–61.
- Webster, Jane (1999) Resisting Traditions: Ceramics, Identity, and Consumer Choice in the Outer Hebrides from 1800 to Present. *International Journal of Historical Archaeology* 3:53–73.
- Weisner, Polly (1983) Style and Social Information in Kalahari San Projectile Points. *American Antiquity* 48:253–276.
- Weisner, Polly (1984) Reconsidering the Behavioral Basis for Style: A Case Study among the Kalahari San. *Journal of Anthropological Archaeology* 3:190–234.
- Weisner, Polly (1985) Style or Isochrestic Variation? A Reply to Sackett. *American Antiquity* 50:160–166.
- Wellner, Kari L. (2006) An Analysis of the Human Remains from the Richter Site (47DR80): Diet and Health at a North Bay Phase, Middle Woodland Site in Door County, Wisconsin. Master’s thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- White, Bruce M. (1999) The Woman Who Married a Beaver: Trade Patterns and Gender Roles in the Ojibwa Fur Trade. *Ethnohistory* 46:109–147.
- Wiley, Gordon R., and Philip Phillips (1958) *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.
- Wilson, Stephen W. (2016) A Comparison of Oneota and Langford Lithic Assemblages in Southern Wisconsin and Northern Illinois. Master’s thesis. Department of Anthropology, University of Wisconsin–Milwaukee.
- Winterhalder, Bruce, and Carol Goland (1997) An Evolutionary Ecology Perspective on Diet Choice, Risk, and Plant Domestication. In *People, Plants, and Landscapes: Studies in Paleoethnobotany*, edited by Kristen J. Gremillion, pp. 123–160. University of Alabama Press, Tuscaloosa.
- Wisconsin Board of Commissioners of Public Lands (2017) *Wisconsin Public Land Survey Records: Original Field Notes and Plat Maps*. Electronic document, <http://digioll.library.wisc.edu/SurveyNotes/SurveyNotesHome.html>, accessed March 24, 2017.
- Wisconsin Department of Natural Resources (2005) *Environmental Assessment on the Petition of the Rock-Koshkonong Lake District to Amend Order 3 SD-82-809, Regarding the Indianford Dam and Lake Koshkonong Water Levels*. Wisconsin Department of Natural Resources, Madison.
- Wisconsin Department of Natural Resources (2019) Hillshade from LIDAR. Electronic document, [https://dnrm.wisconsin.gov/arccgis\\_image/rest/services](https://dnrm.wisconsin.gov/arccgis_image/rest/services), accessed January 5, 2020.
- Wisconsin Historical Society (2015) Wisconsin Historical Preservation Database: Archaeological Sites Inventory. Electronic document, [wisahrd.org](http://wisahrd.org), accessed September 27, 2016.
- Wisconsin View (2017) *Wisconsin View Data Portal*. Electronic document, <http://relief.ersc.wisc.edu/wisconsinview/form.php>, accessed February 10, 2019.
- Wobst, H. Martin (1977) Stylistic Behavior and Information Exchange. In *For the Director: Research Essays in Honor of James B. Griffin*, edited by Charles E. Cleland, pp. 317–342. Anthropological Papers 61. Museum of Anthropology, University of Michigan, Ann Arbor.

- Wylie, Alison A. (1992) Heavily Decomposing Red Herrings: Scientific Method in Archaeology and the Loading of Evidence with Theory. In *Metaarchaeology*, edited by Lester Embree, pp. 269–288. Kluwer Academic, Amsterdam.
- Yaeger, Jason, and Marcello-Andrea Canuto (2000) Introducing an Archaeology of Communities. In *The Archaeology of Communities: A New World Perspective*, edited by Marcello-Andrea Canuto and Jason Yaeger, pp. 1–15. Routledge, New York.
- Young, Harley L., and William G. Batten (1980) *Ground-Water Resources and Geology of Washington and Ozaukee Counties, Wisconsin*. Information Circular 38. United States Department of the Interior, Geological Survey and University of Wisconsin-Extension Geological and Natural History Survey, Madison.
- Zedeño, María Nieves (1997) Landscapes, Land Use, and the History of Territory Formation: An Example from the Puebloan Southwest. *Journal of Archaeological Method and Theory* 4:67–103.
- Zedeño, María Nieves, Diane Austin, and Richard Stoffle (1997) Landmark and Landscape: A Contextual Approach to the Management of American Indian Resources. *Culture and Agriculture* 19:123–129.
- Zych, Thomas (2013) The Construction of a Mound and a New Community: An Analysis of the Ceramic and Feature Assemblages from the Northeast Mound at the Aztalan Site. Master's thesis. Department of Anthropology, University of Wisconsin–Milwaukee.



# OCCASIONAL PAPERS

Official Publication of the Midwest Archaeological Conference, Inc.

Editor Thomas E. Emerson

## CONTENTS

Life, Death, and Landscapes at Lake Koshkonong:  
Oneota Archaeology in Southeastern Wisconsin

Edited by Robert J. Jeske, Richard W. Edwards IV, and Katherine M. Sterner

<b>1. New Perspectives from Lake Koshkonong</b>	
Robert J. Jeske, Katherine M. Sterner, and Richard W. Edwards IV	1
<b>2. Upper Mississippian Stone Tools and Community Organization</b>	
Katherine M. Sterner	27
<b>3. Identities in Clay: Displays of Group Identity on Pottery from Oneota Villages on Lake Koshkonong</b>	
Seth A. Schneider and Natalie A. Carpiaux	47
<b>4. Risky Landscapes: Agriculture and Risk Management in Upper Mississippian Societies</b>	
Richard W. Edwards IV	63
<b>5. Archaeofauna as Evidence for a Specialized Oneota Economy</b>	
Rachel C. McTavish	83
<b>6. The Social Landscape of Eleventh- to Fifteenth-Century Lake Koshkonong</b>	
Robert J. Jeske	103