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EVALUATING THE TIMING OF EARLY VILLAGE DEVELOPMENT IN NEW YORK: MORE DATES FROM CLASSIC NEW YORK SITES

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ABSTRACT. Five sites in present-day New York have played important roles in archaeological narratives surrounding the development of settled village life in northeastern North America. Excavated in the mid-twentieth century, the Roundtop, Maxon-Derby, Sackett or Canandaigua, Bates, and Kelso sites include evidence related to the transition from semisedentary settlement-subsistence patterns during the twelfth through fourteenth centuries AD to those associated with fifteenth century and later settled Iroquoian villagers. Radiocarbon dates for each site were obtained early in the development of the method and again following the transition to AMS dating. Here, we present new or recently-published dates for these sites, combined with reliable existing dates in Bayesian models, including in some cases short tree-ring sequenced wiggle-matches on wood charcoal. Our results clarify the timing of each site's occupation(s), revealing both continuity and discontinuity in the development of longhouse dwellings, sedentism, and the repeated re-use of some site locations over hundreds of years.

KEYWORDS: AMS dating, Bayesian modeling, New York early villages.

INTRODUCTION

The establishment of site chronologies is a first step in archaeological analyses; understanding a site's placement in a regional chronology is necessary for modeling changes in human behaviors. Archaeologists have developed a range of methods and techniques for chronological control. Since the 1950s, radiocarbon dating has been an increasingly important method for establishing the chronological framework for specific sites and regional sequences during the last 50,000 years. The more than 70-year history of radiocarbon dating in archaeology has resulted in hundreds to thousands of dates in any given region, and there are now numerous online regional databases of radiocarbon dates. Many of these are what can be considered legacy dates in that they were obtained prior to contemporary sampling and laboratory protocols regarding both archaeological contexts and associations and laboratory pretreatment methods; most often on unidentified wood charcoal. Legacy dates are generally less accurate and precise than those dates obtained through contemporary accelerator mass spectrometry (AMS) ^{14}C dating on specific samples from annual plant material and bone collagen from short-lived animals with terrestrial diets. The chronologies of a number of "classic" sites dated decades ago could therefore be usefully refined in chronological terms if contemporary methods were applied. Since these sites tend to be key to long-standing regional assessments and modeling, this becomes more pressing within the field and progress is dependent on re-evaluation of curated collections and published data. In these circumstances it is necessary to periodically return to the collections of previously dated sites to obtain new samples for modern scientific dating to test and refine the chronological placements

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of those "classic" sites that have shaped our standard archaeological framework and narrative for a given region. Newly obtained AMS dates often result in changes in site-specific dates of occupations, shifting our understandings of regional chronologies. Because only milligram-sized samples are needed for current precise AMS dating, it is often possible to date annual plant structures to avoid the potential of built-in ages that occur in wood charcoal. Bayesian analysis of radiocarbon dates allows the incorporation of prior knowledge in modeling site-specific and regional chronologies. Informative priors derived from the archaeological record include stratigraphic relationships or the assumption that all dates derive from a single event, i.e., the creation of a feature or the occupation of a site. Prior information may also be derived from the sample itself, i.e., in the case of tree-ring wiggle matching, which also employs the shape and features of the calibration curve as informative. Here we revisit the chronologies of five sites that have played key roles in the development of Indigenous histories in present-day New York with new AMS dates and/or Bayesian modeling.

The seventeenth-century AD ethnohistorical and mid-fourteenth through seventeenth century AD archaeological records indicate that Iroquoian-speaking peoples in portions of present-day New York, Ontario, and Québec (Northern Iroquoia) lived in palisaded villages and towns consisting of multiple longhouses with communities comprised of hundreds to over 1000 individuals (note: all calendar dates AD in this paper). Recent programs of AMS dating and Bayesian modeling have changed understandings of subregional chronologies and, as a result, assessments of Iroquoian socio-political dynamics, intraregional violence, nation and confederacy formations, population movements, and circulations of European-derived materials (e.g., Manning et al. 2018, 2021; Abel et al. 2019; Birch et al. 2021; Manning and Birch 2022). The centuries before this period, however, remain less well understood. It has been long recognized that there was substantial variation in settlement patterns during the eleventh through fourteenth centuries (e.g., Ritchie and Funk 1973), but little has been done to gain better chronological control over sites from this time span.

Since the 1970s, five sites in New York have played important roles in building Indigenous histories prior to the wide-spread occurrence of longhouse villages in Northern Iroquoia. These are the Roundtop, Maxon-Derby, Sackett or Canandaigua, Bates, and Kelso sites (Figure 1). Small numbers of (routine) radiometric radiocarbon dates on large samples of unidentified wood charcoal obtained in the 1960s were used in conjunction with the established culture history to estimate the timings of these sites' occupations (Ritchie and Funk 1973). Several decades later, series of radiometric and AMS dates were used to refine their chronologies (Hart 1999, 2000; Hart and Lovis 2007). Kelso was subsequently included in a large regional program of re-dating Iroquoian village sites through AMS dating and Bayesian modeling (Birch et al. 2021). Here we report on a series of new AMS dates on samples from Maxon-Derby, Sackett, and Bates with results from the Bayesian modeling of the dates from each of the five sites. The results refine their chronologies adding to our understandings of early village development in this region.

Archaeological Background

Excavations of the five sites in the late 1950s and 1960s by the New York State Museum (NYSM) were reported by Ritchie and Funk (1973). As part of their settlement pattern study, Ritchie and Funk provided data on postmold and feature types and distributions, and their interpretations of settlement patterns. As a result of this publication, these sites came to typify

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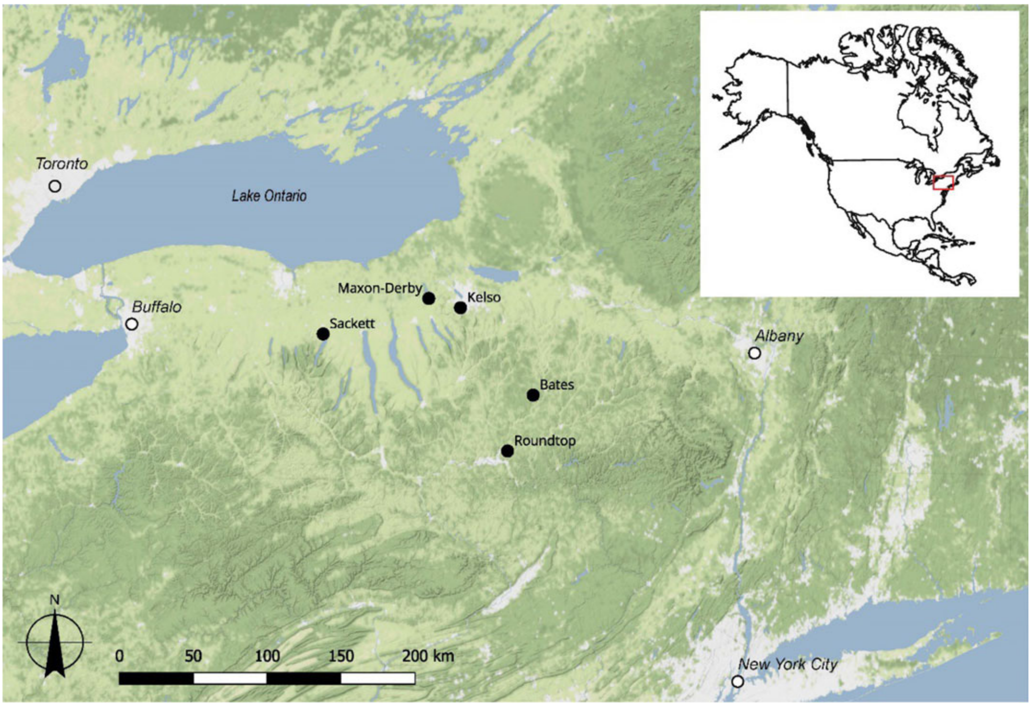

Figure 1 Locations of sites discussed in text.

early evidence for villages and hamlets (seasonally occupied non-village sites) in New York prior to the widespread occurrence of palisaded longhouse villages.

The Roundtop site is located in the upper Susquehanna River valley in the village of Endicott, west of Binghamton. It was excavated by avocational archaeologists in the early 1960s, a crew from the NYSM in 1964, and the State University of New York (SUNY) at Binghamton (now Binghamton University) archaeological field schools in 1965 and 1966 (Ritchie and Funk 1973:179). The site occupies approximately 0.75 acres of which 901 square meters were excavated by NYSM and SUNY Binghamton. These excavations resulted in the exposure of postmold patterns representing two overlapping longhouses, as well as 226 pit features and hearths (Figure 2). Both the excavation records (and plans) and the radiocarbon dates indicate that House 1 is older than and likely entirely discrete from the later superimposed House 2. The location of the site in a floodplain may reflect seasonal occupation necessitating repeated rebuilding episodes (Trigger 1981:25). There was no evidence for a stockade. Unusual for the time in the Northeast, prior to the implementation of flotation recovery, macrobotanical remains of maize, common bean, and squash were recovered together on a bark lining in a deep pit, Feature 35. Based on Ritchie's analysis of the pottery assemblage and a single radiocarbon date on a large unidentified wood charcoal sample of 880 ± 70 ^{14}C years BP (Y-1534) from a different pit feature, Ritchie and Funk (1973:186) ascribed an eleventh century date to the site. As a result, Roundtop became established in the literature as having the earliest-dated longhouses and evidence for maize-bean-squash agriculture in northeastern North America (Chapdelaine 1993:194). Hart (1999, 2000) subjected maize and common bean to AMS dating and wood charcoal to radiometric and AMS dating (Table 1) and determined that the

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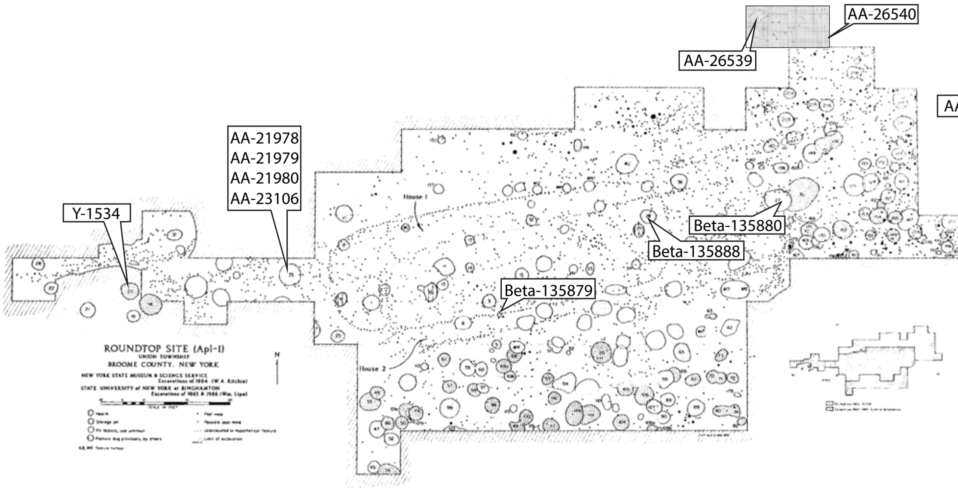

Figure 2 Roundtop site plan showing sample locations. Figure compiled after Ritchie and Funk (1973: Fig. 17). Squares outside the original published site plan derived from field notes on file at the New York State Museum.

longhouses probably dated to the fourteenth and sixteenth centuries AD and common bean to the early fourteenth century AD. In the case of Feature 35 it is clear sample 1 (Hart 2000: Table 4.2), AA-21978, represents later House 2 period re-use of a pit previously used during the time of the earlier House 1. While no additional radiocarbon dates have been obtained for the site, the existing dates have not been previously subjected to Bayesian modeling incorporating the prior information available from the archaeological record and specifically the aforementioned inferred sequence of sample contexts.

The Maxon-Derby site is in the Finger Lakes region east of the City of Syracuse. It is estimated to have an area of 2 acres. Some 650 square meters of site were excavated in 1959 and 1960 by crews from the NYSM. This resulted in the exposure of a large number of postmolds and 117 features including pits and hearths. Ritchie and Funk inferred 6 house patterns of varying size and shape from the distributions of postmolds (Figure 3). There was no evidence of a stockade. Based on two radiocarbon dates on unidentified wood charcoal samples combined from several hearths, 800 ± 100 ^{14}C years BP (Y-1173) and 800 ± 150 ^{14}C years BP (M-176), Ritchie and Funk suggested a twelfth-century date for the site. Hart (2000) subsequently obtained two AMS and three radiometric dates on samples of unidentified wood charcoal. Based on these and an analysis of the pottery assemblage he suggested calibrated calendar age occupations in the eleventh- and mid-twelfth to mid-thirteenth-centuries.

The Sackett or Canandaigua site is located in the Finger Lakes region immediately west of the City of Canandaigua and 2.5 km northwest of the foot of Canandaigua Lake. The site occupied an area of approximately 3 acres encircled by an ellipsoidal ditch or trench measuring 74 m east-west and 61.6 m north-to-south (Figure 4). The ditch measured 2.1 to 3.5 m wide, and 61 to 119 cm deep, as measured in 1934 (Ritchie 1936). Ritchie (1936; Ritchie and Funk 1973:213) suggested that soil from the ditch excavation was used to form a parallel embankment on the inside edge of the ditch, which in turn supported a palisade. If these existed, they were obliterated by a long history of Euro-American plowing. Additional outlying ditches suggested to Ritchie (1936:24–29) that the site had been expanded because of population growth. A small

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Table 1 Radiocarbon dates from five early village sites in the New York Finger Lakes region. Gray shading indicates dates omitted from the modeling (see text for explanation).

Site	NYSM #	Provenience	Material dated	Lab number	^{14}C age BP	$\delta^{13}C$	$\delta^{15}N$	C/N	Source
Bates	A41967	Feature 66, storage pit	Nut shell (*Juglans cinerea*)	UGAMS-53044	655 ± 21	–25.9			This study
	A41967	Feature 66, storage pit	Maize (*Zea mays*)	UGAMS-53045	670 ± 21	–8.4	6.6		This study
	A41967	Feature 66, storage pit	Maize (*Zea mays*)	UGAMS-53046	546 ± 20	–9.0			This study
	A41967	Feature 66, storage pit	Maize (*Zea mays*)	UGAMS-53046r	637 ± 25	–8.7			This study
	A41950-C	Feature 46, storage pit	Wood charcoal, *Quercus* sp., RY1-5	UGAMS-59365	870 ± 25	–26.1			This study
	A41950-C	Feature 46, storage pit	Wood charcoal, *Quercus* sp., RY18-22	UGAMS-59366	820 ± 25	–26.3			This study
	A41991-A	Feature 89, storage pit	Wood charcoal, *Ulmus* sp., RY1-5	UGAMS-19367	890 ± 20	–27.0			This study
	A41991-A	Feature 89, storage pit	Wood charcoal, *Ulmus* sp., RY26-30	UGAMS-19368	910 ± 20	–26.6			This study
	A41842	Feature 21, storage pit	Unidentified wood charcoal	Beta-135885	910 ± 50	–25.0*			Hart 2000
	A41964	Feature 63, storage pit	Unidentified wood charcoal	Beta-135886	720 ± 50	–25.0*			Hart 2000
	A41951	Feature 65, shallow pit	Unidentified wood charcoal	Beta-135887	890 ± 50	–25.0*			Hart 2000
	A41843	Feature 22, storage pit	Unidentified wood charcoal	M-762	660 ± 200				Ritchie and Funk 1973
	A41991-A	Feature 89, storage pit	Unidentified wood charcoal	I-425	825±100				Ritchie and Funk 1973
	A41823-A	Features 1A and 1B	Unidentified wood charcoal	Y-1174	760 ± 100				Ritchie and Funk 1973
Kelso	A42637B	Postmold, E10 S0	Maize (*Zea mays*)	GrM-14982	543 ± 18	–8.7			Birch et al. 2021
	A71655	Structure 9 postmold	Maize (*Zea mays*), split	GrM-14983	634 ± 25	–8.2			Birch et al. 2021
	A71655	Structure 9 postmold	Maize (*Zea mays*), split	UGAMS-35644	576 ± 19	–8.7			Birch et al. 2021
	A72816	Feature 17, support post	Unidentified wood charcoal	Beta-138610	880 ± 40	–27.5			Hart 2000
	A71634	Feature 2, hearth	Unidentified wood charcoal	Beta-135891	720 ± 40	–23.2			Hart 2000
	A42591	Feature 36, roasting pit	Maize (*Zea mays*)	ISGS-A0657	600 ± 30	–8.9			Hart and Lovis 2007
	A71655	Postmold, E70 S18	Maize (*Zea mays*)	ISGS-A0661	560 ± 25	–8.3			Hart and Lovis 2007
	A72789	Feature 27, small pit	Monocot blade	ISGS-A0660	560 ± 30	–9.8			Hart and Lovis 2007

(Continued)

Table 1 (*Continued*)

Site	NYSM #	Provenience	Material dated	Lab number	^{14}C age BP	δ^{13}C	δ^{15}N	C/N	Source
	A41101-81	Refuse concentration	Charred cooking residue on sherd	ISGS-A0657	520 ± 30	–24.3			Hart and Lovis 2007
	A42572	Feature 6, hearth	Unidentified wood charcoal	Y-1380	560 ± 100				Ritchie and Funk 1973
Maxon-Derby	A42120-B	House A, Feature 14, hearth	Maize (*Zea mays*)	UGAMS-53047	741 ± 20	–9.2			This study
	A42120-B	House A, Feature 14, hearth	Maize (*Zea mays*)	UGAMS-53047r	829 ± 25	–9.5			This study
	A42120-B	House A, near Feature 14	Maize (*Zea mays*)	UGAMS-53048	777 ± 21	–7.9	7.5		This study
	A42170	House A, Feature 23, hearth	Maize (*Zea mays*)	UGAMS-53049	788 ± 21	–8.1	6.1		This study
	A42200	House D, Feature 73, small pit	Nut shell (*Juglans cinerea*)	UGAMS-53050	806 ± 22	–27.1			This study
	A42186	House C, Feature 51, hearth	Wood charcoal (*Fagus grandifolia*) RY1-9	UGAMS-59369	960 ± 25	–27.5			This study
	A42186	House C, Feature 51, hearth	Wood charcoal (*Fagus grandifolia*), RY16-20	UGAMS-59370	920 ± 20	–26.5			This study
	A42122	House A, Feature 18, small ash pit	Unidentified, wood charcoal	Beta-143103	890 ± 40				Hart 2000
	A42170-A	House A, Feature 23, hearth	Unidentified wood charcoal	Beta-135881	1000 ± 50	–25.0*			Hart 2000
	A42208-D	House A, Feature 26, hearth	Unidentified wood charcoal	Beta-135889	980 ± 40	–28.2			Hart 2000
	A42188-A	House E, Feature 56, hearth	Unidentified wood charcoal	Beta-135882	820 ± 80	–25.0			Hart 2000
	A42194-B	House F, Feature 66, hearth	Unidentified wood charcoal	Beta-135883	840 ± 70	–25.0			Hart 2000
		Several hearths	Unidentified wood charcoal	Y-1173	850 ± 100				Ritchie and Funk 1973
		Several hearths	Unidentified wood charcoal	M-1077	850 ± 150				Ritchie and Funk 1973
Roundtop	A42764	Feature 35, Layer 5	Maize (*Zea mays*)	AA-21978	330 ± 45	–8.8			Hart 1999
	A42764	Feature 35, Layer 5	Maize (*Zea mays*)	AA-21979	675 ± 55	–8.7			Hart 1999
	A42764	Feature 35, Layer 5	Unidentified wood charcoal, twig	AA-21980	670 ± 55	–27.6			Hart 1999
	A42764	Feature 35, Layer 5	cotyledon, common bean (*Phaseolus vulgaris*.)	AA-23106	658 ± 48	–27.2			Hart 1999
	A45371	Postmold, E100 N70	Maize (*Zea mays*)	AA-26539	440 ± 45	–8.7			Hart 1999
	A45327	Postmold E110 N70	Cotyledon, common bean (*Phaseolus vulgaris*)	AA-26540	315 ± 45	–25.0			Hart 1999
	A45500	Feature 235	Maize (*Zea mays*)	AA-26541	830 ± 45	–8.7			Hart 1999
	A42756-C	Feature 4	Unidentified wood charcoal	Beta-135879	300 ± 80	–25.0*			Hart 2000

Table 1 (*Continued*)

Site	NYSM #	Provenience	Material dated	Lab number	^{14}C age BP	$\delta^{13}C$	$\delta^{15}N$	C/N	Source
	A722270	Feature 27	Unidentified wood charcoal	Beta-135880	630 ± 60	–25.0*			Hart 2000
	A42760-C	Feature 28	Unidentified wood charcoal	Beta-135888	650 ± 40	–26.6			Hart 2000
	A42755	Feature 20	Unidentified wood charcoal	Y-1534	880 ± 60				Ritchie and Funk 1973
Sackett	A42095.116	Main ditch	Deer (*Odocoileus virginianus*)	UCIAMS-270843	635 ± 20	–22.3	6.0	3.2	This study
	A42096.638	Main ditch	Deer (*Odocoileus virginianus*)	UCIAMS-270844	675 ± 20	–22.5	4.3	3.2	This study
	A42097.38	Main ditch	Deer (*Odocoileus virginianus*)	UCIAMS-270845	590 ± 20	–22.0	4.3	3.2	This study
	A42066-D	Feature 2	Unidentified wood charcoal	Beta-135884	750 ± 50				Hart 2000
	A42092-B	Feature 11	Unidentified wood charcoal	Beta-135880	840 ± 40				Hart 2000
		Midden	Unidentified wood charcoal	M-1076	820 ± 75				Ritchie and Funk 1973

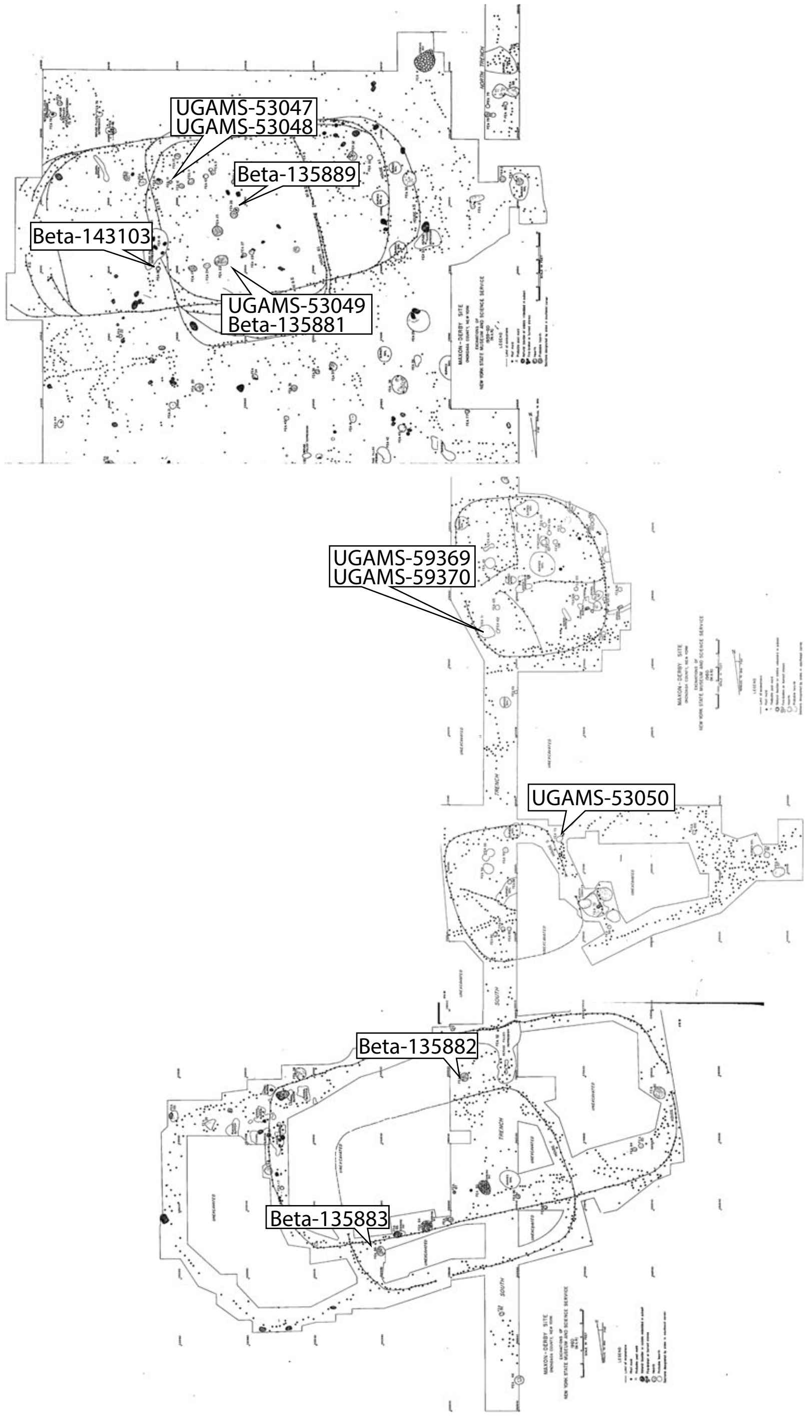

Figure 3 Maxon-Derby site plan showing sample locations. Figure compiled after Ritchie and Funk (1973: Figs. 19–21).

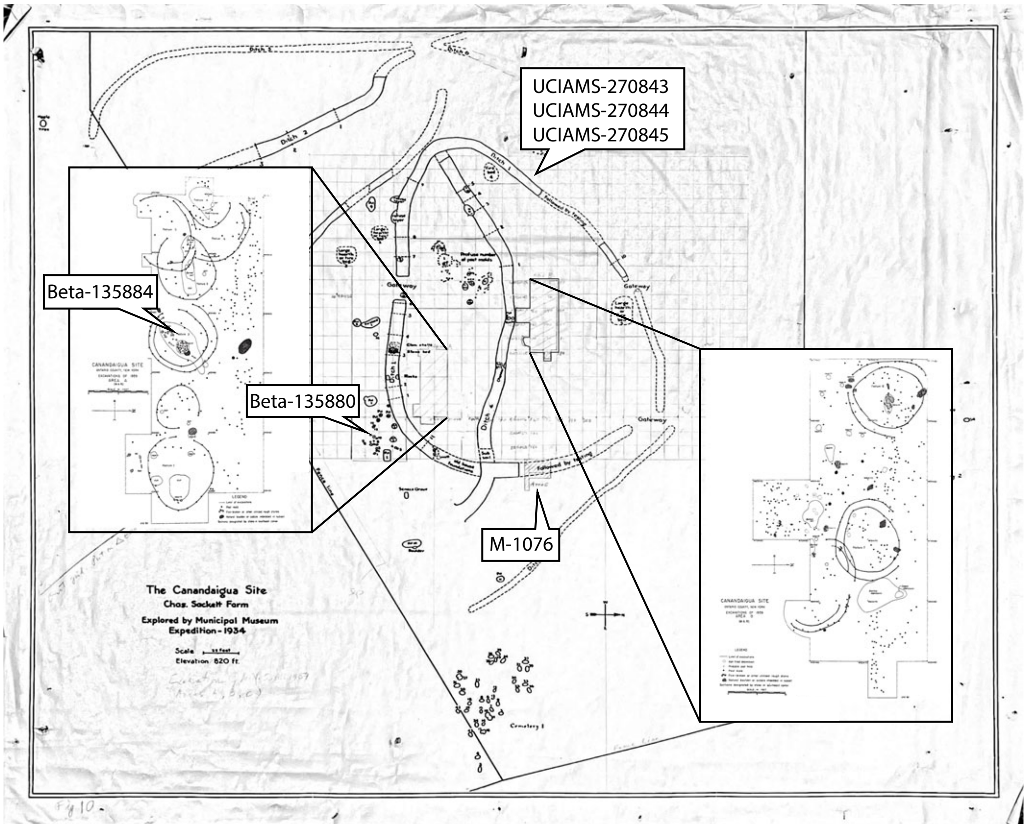

Figure 4 Sackett site map showing excavated areas and locations of radiocarbon samples. Compiled after Ritchie (1936), Ritchie and Funk (1973: Figs. 22 and 23).

portion of the site within the ditch was excavated by Ritchie and a crew from the Rochester Museum in 1934 (Ritchie 1936), exposing postmold patterns that appeared to represent two small circular structures. Additional excavations were carried out by Ritchie with a crew from the NYSM in 1959 in three areas of the site totaling 218.5 square meters of the village interior and 23 square meters over the main ditch. The distributions of postmolds suggested the patterns of eight small circular structures (Ritchie and Funk 1973:214–218), although others have suggested these patterns might better be interpreted as incompletely uncovered longhouses (Prezzano 1988; Snow 1980:313; Trigger 1981:12). Sixty-three hearths and 15 pit features were also documented during the two excavation seasons. Two cemeteries, from which a total of 57 burials were excavated, lay just outside the main site precinct to the east and north. Among this mortuary population were six males whose remains exhibited embedded projectile points and other evidence of perimortem trauma. One radiocarbon date of 820 ± 150 ^{14}C years BP (M-1076) was obtained in 1960 on unidentified wood charcoal collected from an ash deposit below an intact midden. Hart (2000) obtained one AMS and one radiometric date on unidentified wood charcoal samples from each of two hearths which together suggested a thirteenth-century occupation.

The Bates site is located approximately 24 km north of Binghamton in the Town of Greene above the Chenango River, a north-south flowing tributary of the Susquehanna River. The site

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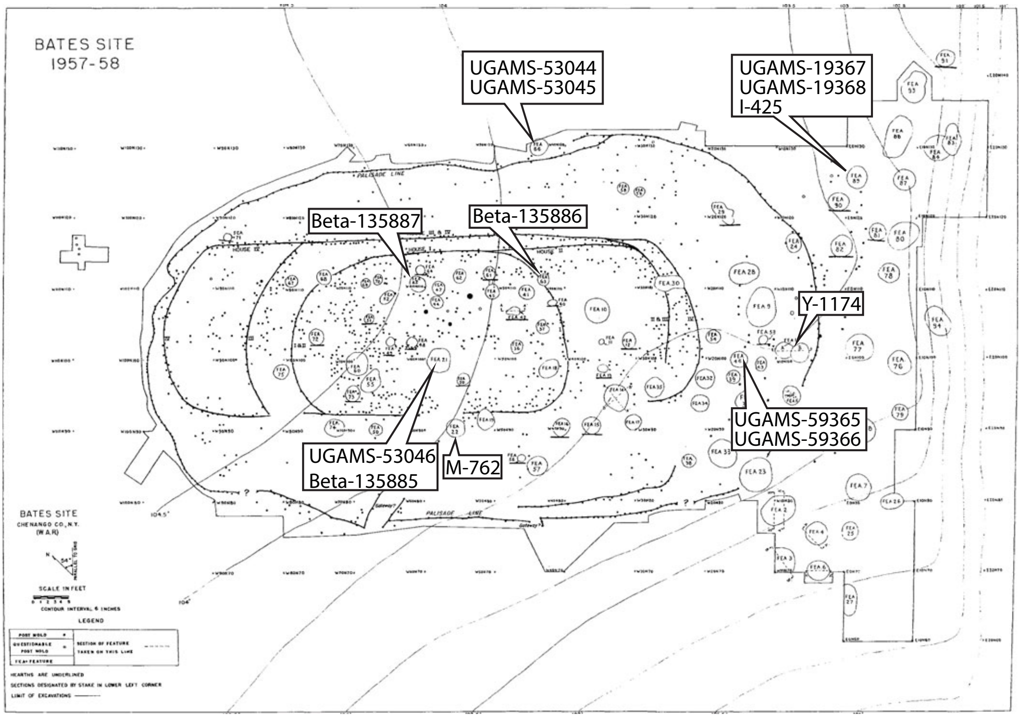

Figure 5 Bates site plan with sample locations indicated. Modified after Ritchie and Funk (1973: Fig. 24).

was excavated in 1957 and 1958 by Ritchie and crews from the NYSM. Excavations occurred in a 2006 square meter area, which exposed many postmolds and features (Figure 5). The postmold patterns indicated an oval stockade measuring 27.4 by 15.2 m. Postmolds within the stockade pattern suggested either a series of circular structures or a sub-rectangular structure with a series of four enlargements resulting in a longhouse. Ritchie and Funk (1973:232) ultimately decided the latter was the more likely of the two interpretations as it better accounted for the number of postmolds than the alternative. A total of 61 pit features, three "cooking pits", and 19 hearths were also recorded. Three radiocarbon dates were obtained by Ritchie and Funk (1973:251) on unidentified wood charcoal. Of these they believed the date of 760 ± 100 ^{14}C years BP (Y-1174) best matched the pottery assemblage. Hart (2000) later obtained three radiometric dates on unidentified wood charcoal, which when calibrated, suggested twelfth- to thirteenth-century occupations.

The Kelso site is located in the Finger Lakes region 1.6 km south of the Village of Elbridge near Skaneateles Creek and Lake. Limited excavations were carried out in 1952 by Ritchie, in 1960 by Ritchie and Funk, and in 1962 by Syracuse University students. Large-scale excavations were carried out by Ritchie and Funk and a crew from the NYSM and Syracuse archaeological field school in 1963 exposing an area of 929 square meters with additional trenching to expose lines of postmolds representing house and palisade outlines. Excavations indicated two overlapping palisaded villages, each encompassing approximately 2 acres. Each palisade was represented by two rows of postmolds 1.2 to 2 m apart. Eight house patterns and four probable house patterns, including three longhouses and nine smaller oval patterns, were inferred from postmold disributions in the large excavation area (Figure 6). Also documented were 3 roasting

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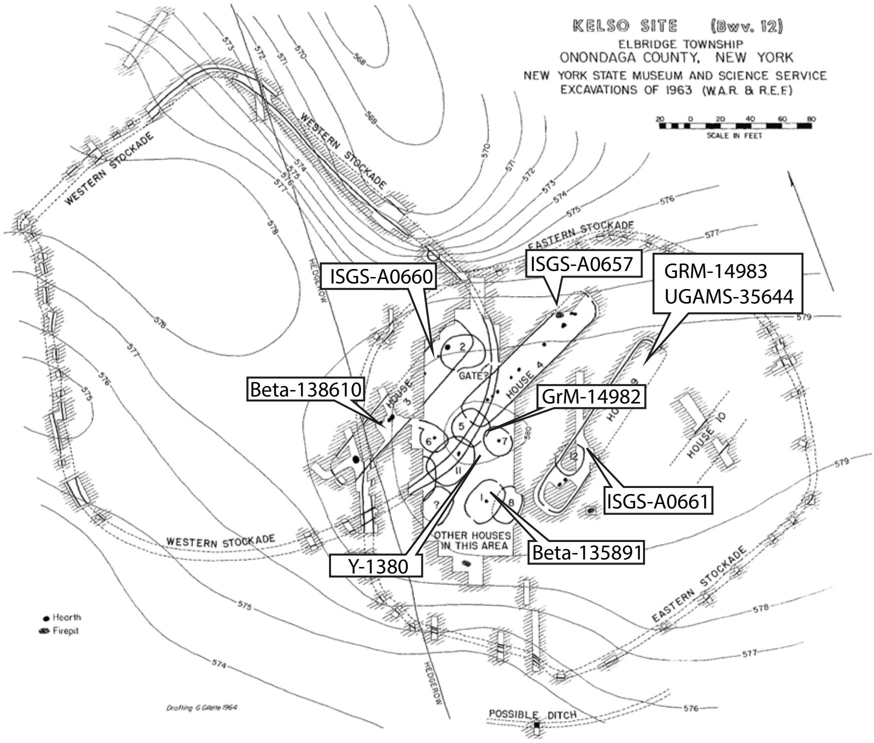

Figure 6 Kelso site settlement plan. Modified after Ritchie and Funk (1973: Fig. 25). The refuse-filled depression from which sample ISGS-A0657 derived not on map.

pits, 17 hearths, and 7 refuse-filled postmolds. A radiocarbon date on unidentified wood charcoal was obtained in 1963 of 690 ± 100 ^{14}C years BP (Y-1380), based on which Ritchie and Funk (1973:274) suggested a fourteenth-century occupation. Hart (2000) obtained two AMS dates on wood charcoal that suggested a thirteenth-century occupation. One of these (Beta-38610), however, represented a large support post for one of the longhouses and therefore (depending on the age of the relevant tree) may have included substantial built-in age. Hart and Lovis (2007) reported AMS dates on two maize kernels and one each on a monocot blade and pottery cooking residue, which indicated a calibrated calendar fourteenth-century occupation. Birch et al. (2021) reported three AMS dates on maize kernels, which with Bayesian modeling as part of their Onondaga Sequence, indicated an early fifteenth century occupation.

METHODS AND MATERIALS

New AMS ^{14}C dates were obtained for the present study on samples from Bates, Maxon-Derby, and Sackett. The Bates and Maxon-Derby dates were obtained from The University of Georgia Center for Applied Isotope Studies (UGAMS; https://cais.uga.edu/) and the Sackett dates from University of California-Irvine, W.M. Keck Carbon Cycle Accelerator Mass Spectrometer Facility (UCIAMS; https://sites.ps.uci.edu/kccams/). An acid-alkali-acid pretreatment was used on wood charcoal and macrobotanical samples at Georgia. Bone samples submitted to Keck were prepared after grinding with 1N HCl to decalcify, gelatinized

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at 60°C and pH 2, and then ultrafiltered to select a molecular weight fraction >30kDa. Lab protocols are available on the labs' respective websites. No additional dates were obtained for Kelso and Roundtop, but the existing dates, integrated with the available archaeological information, were subjected to Bayesian modeling.

To acquire new AMS ^{14}C dates for the present study, we reviewed and sampled short-lived seeds, macrobotanical remains, animal bone, and wood charcoal assemblages available in collections associated with Ritchie's excavations at the Bates, Maxon-Derby, and Sackett sites, which are curated at the New York State Museum. The taxon of each archaeobotanical sample was identified and additional plant anatomical features (e.g., stem diameter, number of rings, presence or absence of bark) identified and recorded to reduce issues with in-built age bias and identify wood samples with several annual growth rings suitable for ^{14}C wiggle-matching. Because of limited annual botanical remains available from Sackett, the large faunal bone collection was examined for short-lived animals with terrestrial diets for dating.

Wood charcoal fragments larger than 2 mm were fractured by hand or with a steel razor blade to create fresh transverse, radial, and tangential planes, in order to examine wood anatomical features and identify the taxon as specifically as possible. After fracturing, wood samples were supported in a sand bath or modeling clay and examined under a Motic K-400P stereo microscope at ×6–×50 magnification and an Olympus B×51 polarizing microscope at ×50–×500 magnification. Seeds and non-wood macrobotanical samples were examined under the same set of microscopes. The macro- and micro-anatomical features of wood sections and macrobotanical samples were documented, photographed, and compared with those from modern reference collection materials in the Cornell Tree-Ring Laboratory, standard reference texts (Martin and Barkley 1961; Panshin and De Zeeuw 1980), and the InsideWood (http://insidewood.lib.ncsu.edu) and USDA Plants (https://plants.usda.gov/) online databases. A LEO 1550 field emission scanning electron microscope (FESEM) was used for high magnification observation of anatomical micro-features and high-quality image capture (Figure 7).

The radiocarbon measurements employed are listed in Table 1. We show (gray shading) some additional early dating technology dates with errors of ≥ ±100 ^{14}C years but we do not employ these dates in the models as they are largely uninformative. In two cases there were two separate radiocarbon measurements run on the same sample material but not the exact same pretreated fraction of this material (UGAMS-53046 + UGAMS-53046r, UGAMS-53047 + UGAMS-53047r). The pretreatments involved varied slightly between the two runs. In each case the two resulting ages are not compatible with representing the same radiocarbon age (Ward and Wilson 1978), but this is not unexpected as the sample fractions were different and the pretreatments applied also differed. The two dates in each case are thus independent age estimates of an unknown real radiocarbon age. We thus include both the original and "r" dates as separate information. Modeling employed OxCal (Bronk Ramsey 2009a; 2009b) version 4.4.4 and the IntCal20 calibration curve (Reimer et al. 2020) set at 1-yr resolution. All OxCal terminology (Phase, Sequence, Date, etc.) are designated with upper-case first letters. Date estimates for each site represent a hypothetical event describing the temporal extent of the Phase between its start and end Boundaries (Bronk Ramsey 2017). The OxCal Charcoal Outlier model was applied to dates on wood charcoal samples to approximately allow for in-built age and the OxCal General Outlier model used to test whether dates on short-lived sample material were consistent with the model assumptions/structure at the 5% level. We also consider model versions using the slightly modified Charcoal Plus Outlier model (Dee and Bronk Ramsey 2014)—in particular this version allows for a small probability that some

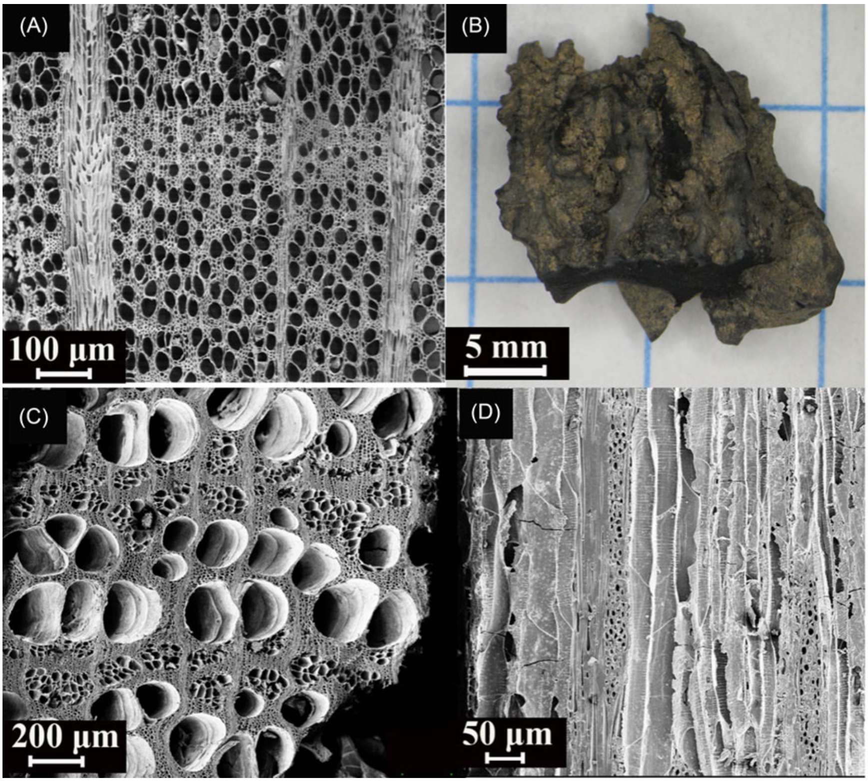

Figure 7 FSEM and light microscope microphotographs of identified wood and archaeobotanical samples from the Bates and Maxon-Derby sites showing their characteristic anatomical features, including (A) Maxon-Derby American beech (*Fagus grandifolia*) wood transverse section; and (B) white walnut (*Juglans cinerea*); Bates elm (*Ulmus* sp.) wood (C) transverse, and (D) tangential sections.

charcoal samples for whatever reason are slightly more recent than expected (for information and the data file to implement the Charcoal Plus Outlier model, see e.g. Manning et al. 2020: S1 File). The differences in results from both chronological models are very small (see: Supplementary Table 1 compared with Table 2 in the main text). We use the results from the "standard" Charcoal Outlier model as available within OxCal in the main text and Figures. Within tree-ring defined Sequence (D_Sequence) "wiggle-matches," the SSimple Outlier model was employed again testing at the 5% level. AA-21980 on an unidentified wood charcoal "twig" (Hart 1999) was treated as likely an effectively short-lived sample (consistent with the radiocarbon age being similar to short-lived samples from the same context). Where model runs could exhibit some variation or potential for poor convergence the kIterations value was increased (e.g., to 100× default at kIterations=3000) for the results reported in Table 2.

Roundtop: Previously acquired AMS dates were grouped as Phases in OxCal based on the distribution of three discrete groups of radiocarbon dates themselves, which exhibited considerable overall spread, and the super-positioning of features and longhouse postmolds and features (with House 2 subsequent to House 1), which indicate some order information and likely multiple periods of occupation (see Hart 2000). The site overall is treated as a Phase with

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Table 2 Results of Bayesian Models of radiocarbon dates for each site and previous date estimates for the sites. Note, values can vary slightly between Bayesian model runs and especially for the very initial start and end Boundaries for the overall site Phase/Sequence. All results from models with Convergence ≥ 95. Gray shading indicates U(0,50) constraint applied to Interval query for Roundtop House 1 and House 2. For the results from the same models run instead with the Charcoal Plus Outlier model (Dee and Bronk Ramsey 2014), see Supplementary Table 1.

	Previous estimates		Bayesian modeling results			
Site	Ritchie and Funk 1973	Hart 2000	Start boundary	Date estimate	End boundary	Agreement
Roundtop (overall)			1050–1231 (68.3)	1192–1569 (68.3)	1533–1712 (68.0)	Model 128
			1057–1231 (68.3)	1196–1553 (68.3)	1714–1715 (0.3)	Overall 124.3
					1523–1687 (68.0)	Model 130.5
					1689–1690 (0.3)	Overall 126.5
			781–1262 (95.4)	972–1779 (95.4)	1488–1955 (95.3)	
			805–1263 (95.4)	985–1748 (95.4)	1957–1962 (0.1)	
					1483–1912 (95.4)	
Roundtop Early	1000–1100		1153–1249 (68.3)	1177–1272 (68.3)	1197–1308 (68.3)	
			1155–1250 (68.3)	1179–1272 (68.3)	1198–1308 (68.3)	
			1048–1271 (95.4)	1071–1384 (95.4)	1162–1511 (95.4)	
			1043–1270 (95.4)	1076–1079 (0.1)	1162–1500 (95.4)	
				1081–1384 (95.4)		
Difference Between				*4–153 or 24–161 years (68.3)*		
				–179 to 206 or –151 to 209 years (95.4)		
Roundtop House 1		1286–1392	1282–1320 (21.9)	1299–1319 (13.3)	1318–1324 (3.4)	
			1348–1386 (46.3)	1356–1398 (55.0)	1367–1417 (64.9)	
			1293–1301 (6.2)	1301–1309 (6.0)	1317–1323 (4.7)	
			1351–1388 (62.1)	1360–1396 (62.2)	1369–1406 (63.5)	
			1264–1394 (95.4)	1284–1416 (95.4)	1298–1443 (95.4)	
			1277–1321 (24.3)	1286–1332 (24.0)	1296–1343 (23.8)	
			1337–1394 (71.2)	1347–1406 (71.4)	1361–1418 (71.6)	
Interval Between				*38–157 or 71–184 years (68.3)*		
				0–215 or 45–258 years (95.4)		
Roundtop House 2		1453–1637	1436–1536 (68.3)	1466–1563 (68.3)	1490–1595 (68.3)	
			1456–1542 (68.3)	1469–1554 (68.3)	1480–1565 (68.3)	
			1386–1597 (95.4)	1430–1637 (95.4)	1463–1670 (95.4)	
			1439–1608 (95.4)	1451–1630 (95.4)	1461–1628 (95.4)	

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Table 2 (*Continued*)

	Previous estimates		Bayesian modeling results			
Site	Ritchie and Funk 1973	Hart 2000	Start boundary	Date estimate	End boundary	Agreement
Maxon-Derby (overall)	1100	1082–1129 (early) 1214–1393 (late)	1073–1155 (68.3)	1144–1280 (68.3)	1273–1329 (68.3)	Model 98.4 Overall 94.5
			988–1169 (93.7) 1199–1214 (1.8)	1063–1335 (95.4)	1235–1392 (95.4)	
Maxon-Derby House A		1041–1257	1223–1269 (68.3)	1233–1241 (8.8) 1250–1279 (59.5)	1268–1290 (68.3)	
			1156–1275 (95.4)	1171–1292 (95.4)	1231–1254 (9.7) 1259–1309 (85.8)	
Maxon-Derby House C			1112–1166 (68.3)	1120–1189 (68.3)	1136–1223 (68.3)	
			1042–1175 (93.4) 1204–1216 (2.0)	1062–1067 (0.4) 1070–1246 (95.0)	1098–1302 (95.4)	
Maxon-Derby House D			1177–1253 (68.3)	1211–1269 (68.3)	1233–1283 (68.3)	
			1105–1267 (95.4)	1147–1299 (95.4)	1217–1333 (95.4)	
Bates Early	1190	1022–1257	1163–1209 (68.3)	1183–1228 (68.3)	1200–1248 (68.3)	Model 77.2
			1072–1221 (95.4)	1131–1269 (95.4)	1187–1289 (95.4)	Overall 78.2
Interval Between			*13–100 years (68.3); 0–150 years (95.4)*			
Bates Later		1214–1393	1262–1306 (48.7) 1344–1372 (19.6)	1294–1337 (33.8) 1352–1396 (34.5)	1328–1345 (14.1) 1373–1429 (54.2)	
			1243–1378 (95.4)	1270–1425 (95.4)	1300–1460 (95.4)	
Sackett	1130	1164–1282	1212–1309 (68.3)	1273–1368 (68.3)	1312–1355 (36.9) 1362–1403 (31.4)	Model 107.4 Overall 107.5
			1123–1374 (95.4)	1190–1427 (95.4)	1302–1477 (95.4)	
Kelso	1390	1045–1278 1325–1418 (Hart & Lovis 2007)	1319–1337 (34.0) 1385–1403 (34.2)	1326–1347 (33.1) 1393–1411 (35.2)	1332–1353 (28.7) 1400–1423 (39.6)	Model 91.9 Overall 92
			1283–1353 (52.5) 1366–1407 (42.9)	1316–1426 (95.4)	1327–1369 (39.7) 1396–1454 (55.7)	
Kelso alternative			1388–1399 (68.3)	1395–1411 (68.3)	1405–1420 (68.3)	
			1379–1405 (95.4)	1386–1425 (95.4)	1400–1434 (95.4)	

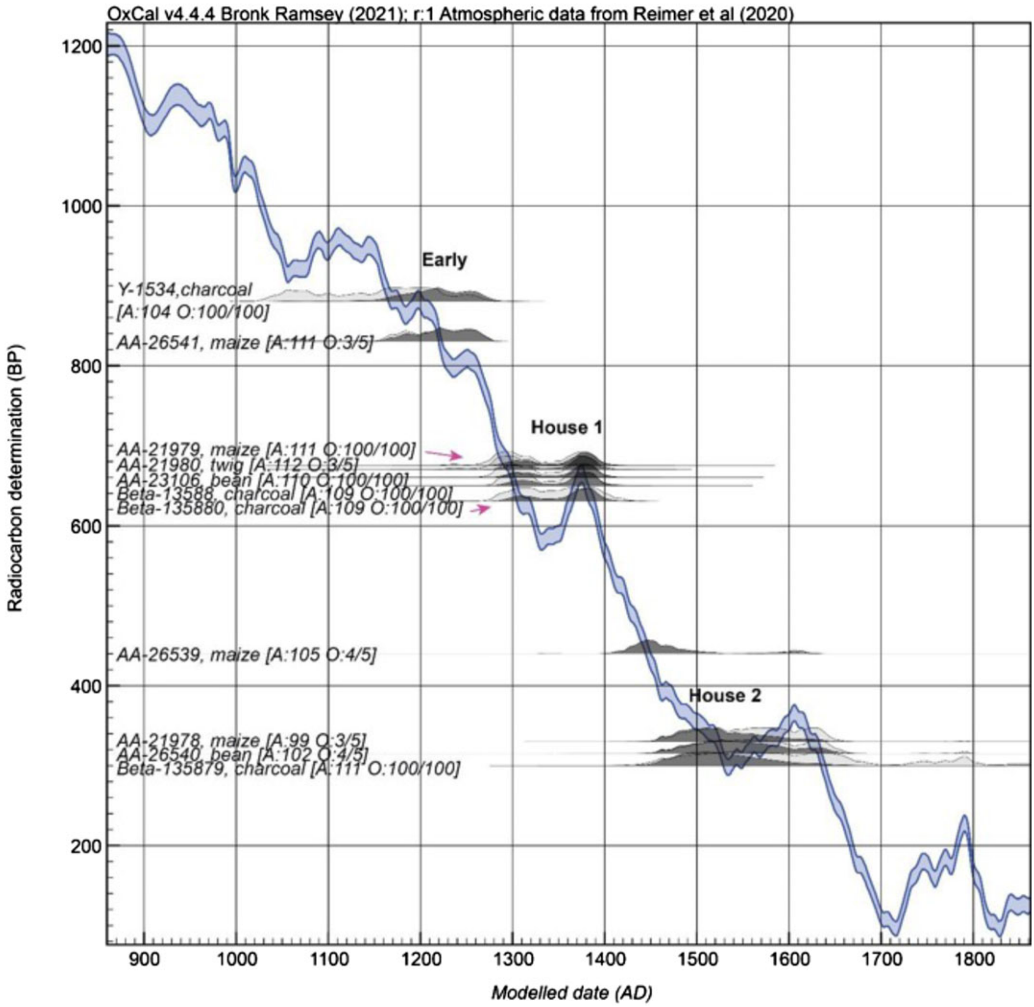

Figure 8 Modeled (dark gray) and non-modeled (light gray) probability distributions (posterior densities) for Roundtop (model with no additional constraints) shown placed against the IntCal20 radiocarbon calibration curve. The three distinct periods of human activity are indicated. AA-26539 may indicate another occupation phase or might be associated with the overall period of House 2 activity at the site.

independent Phases within this for an "early" Phase and then a Sequence with the Phases of House 1 then House 2 (where there is stratigraphic information to confirm a Sequence). Two dates have no clear association with a House (and are thus left merely within the overall site Phase): AA-26539 and AA-26540. The age of AA-26540 suggests it probably is contemporary with House 2, but AA-26539 offers an age a little older than the House 2 dates and may indicate activity in the area in-between the time periods represented by Houses 1 and 2. The House 2 dates lie in an ambiguous area of the radiocarbon calibration curve; they could belong either in the period before the ca. 1535 wiggle or instead in the later 16th century into the early 17th century (Figure 8). The House 1 dates favor the later 14th century but could also be earlier 14th century (Figure 8). Without additional constraints we cannot tell from current information. To explore we might consider a likely maximum lifetime for a single longhouse. If, for example, we consider given wood decay and other relevant degradation processes, that a single longhouse perhaps did not have a lifetime of more than ca. 50 years (and especially in a floodplain context like Roundtop where wood/organic deterioration was likely relatively rapid), then we can consider whether this points to a choice over the more likely date for House 2. Thus, we consider two models for Roundtop: one with the data and no additional constraints, and a second model with a uniform 0–50 years constraint applied to lifetimes of both Houses 1 and 2 (via an Interval query with constraint).

Maxon-Derby: For the present study, AMS dates were obtained on maize kernels, a walnut nutshell, and discrete defined rings of a fragment of a small American beech (*Fagus grandifolia*) branch (Table 1). These samples derive from different contexts (Houses, A, C, D) at the site and the dates from these can be used to describe the chronological placement of these contexts (Phases) within an overall site Phase (Figure 9). Other dates run previously on unidentified wood charcoal samples not associated with Houses A, C, or D were used (with the Charcoal Outlier model applied) to help define a general site Phase and the associated Date estimate for the overall site occupation period.

Sackett or Canandaigua: Three new dates were obtained on white-tailed deer bone (*Odocoileus virginianus*) recovered from the main ditch at the site. Specimen NYSM A-42095.116 was a piece of left dentary and specimen A-42096.63B was a piece of right dentary. Wear patterns and morphology suggested they originated from different animals. Specimen A-42097.38 was from a long bone fragment. Each specimen was sampled at the NYSM and the samples were submitted to the Keck facility for AMS dating. The resulting dates were combined in a Bayesian model with three AMS dates on unidentified wood charcoal previously obtained from the site. The find locations of the samples are different—all the shorter-lived deer bone samples from the north and the previous charcoal samples from contexts in the south and southeast of the site (Figure 4)—but, on the assumption all relate to a single overall period of settlement, we may observe that the older dates (in-built age) on the wood charcoal samples and the more recent dates on the deer bone could all coherently lie within a single sub-century period on the long slope in the radiocarbon calibration curve in the later 13th through mid-14th centuries, and so realistically rule out the alternative later date possibilities from the deer bones in the later 14th century (Figure 10).

Bates: For the present study, new AMS dates were acquired on three short-lived samples (a walnut nutshell fragment [*Juglans cinerea*] and two maize kernels). Two wood charcoal samples with 20+ distinct rings were dissected for wiggle-matching, an oak (deciduous *Quercus* sp.) fragment and an elm (*Ulmus* sp.) fragment. The dates on the outermost exterior (most recent) tree-ring next to the bark, which was preserved and sampled from both wood samples (resulting in no in-built age bias), and on the short-lived samples all should relate to some period of use at the site. We use only those more recent measurements with errors less than ±100 ^{14}C years. The radiocarbon dates fall into two distinct groups which cannot plausibly be over-lapping in calendar time: an early Phase and a later Phase (Figure 11). One date on wood charcoal, Beta-135886, is 100 ^{14}C years later than any of the other dates on charcoal, including two dates on tree-rings from the outer part of the stem or against the bark (UGAMS-59365; UGAMS-59366; UGAMS-19367; UGAMS-19368). This suggests it belongs with the later occupation period at the site (as a plausible TPQ) and not as a late outlier from the earlier occupation period (and we use this assumption in our model).

Kelso: The site was considered as a single overall Phase (Figure 12). Two dates on unidentified wood charcoal are assumed to provide TPQ information and are modeled with the Charcoal Outlier model to approximately allow for what appears to be substantial to moderate in-built

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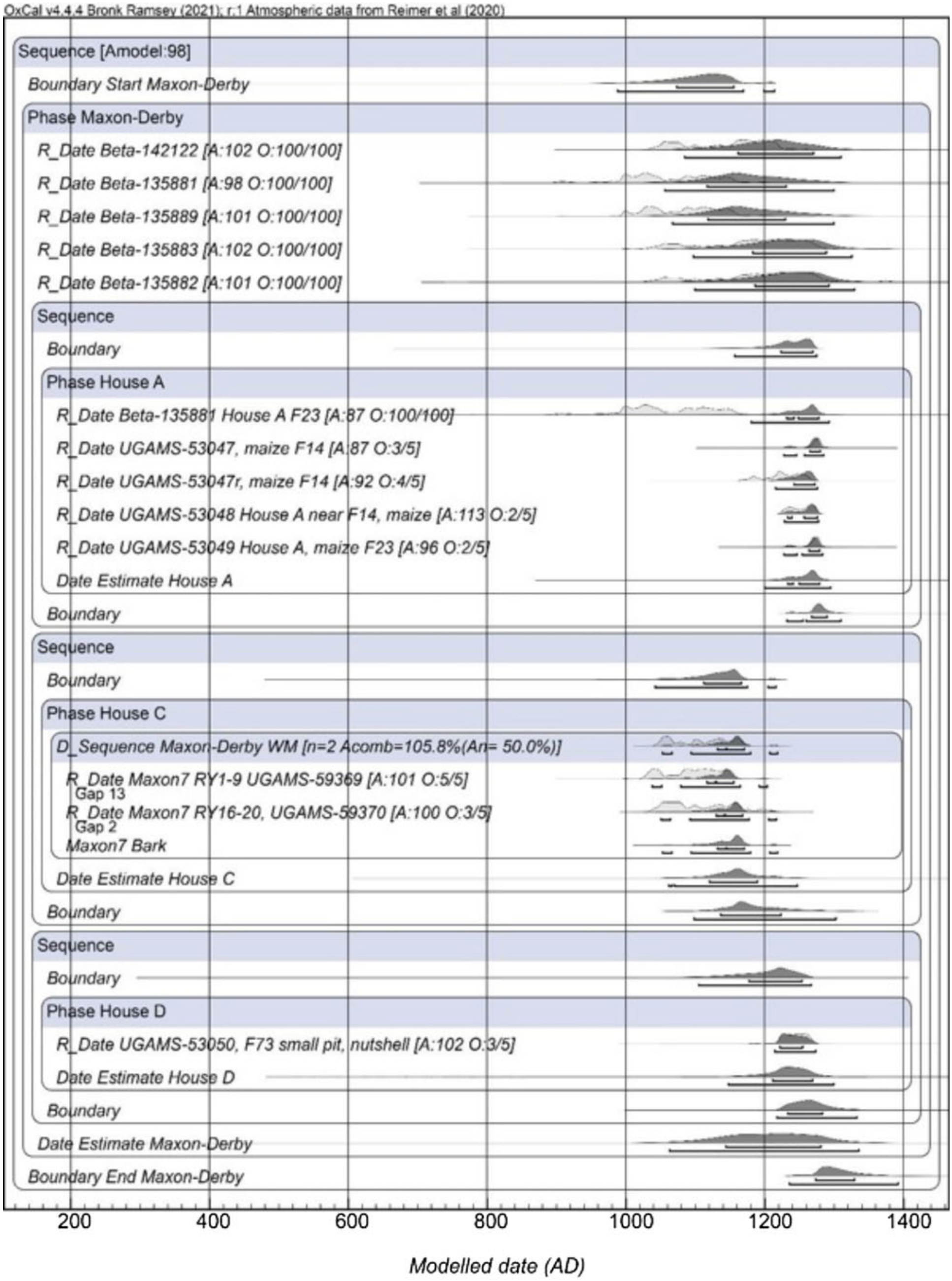

Figure 9 Maxon-Derby model showing the model structure with modeled (dark solid distributions) and non-modeled (light gray probabilities) calendar probabilities (posterior densities) for the samples. The lines under each distribution show the 68.3% and 95.4% hpd ranges. A values indicate individual OxCal agreement values (should be ≥ 60) and the O values are Outlier model posterior/prior values (note for samples with the Charcoal Outlier model applied these are always 100/100, for the other samples the prior is a 5% outlier probability).

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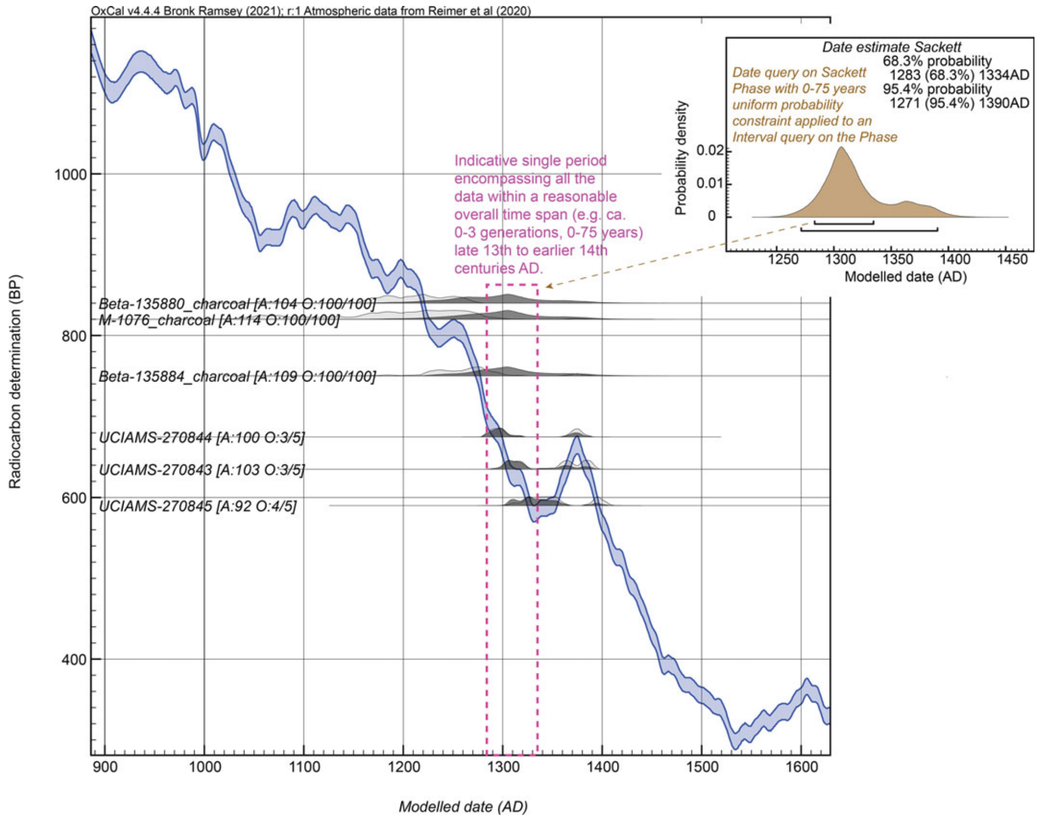

Figure 10 Modeled (dark solid distributions) and non-modeled (light gray probabilities) calendar probabilities (posterior densities) for Sackett shown placed against the IntCal20 radiocarbon calibration curve. If the overall site occupation is not regarded as excessively long, and if all the available data are assumed to belong to a single coherent period, then they appear to fit best on the slope from the later 13th through earlier 14th centuries, for example as indicated (approximately) by the dashed box (example from the 68.3% hpd range from a Date query on the Phase with an Interval query applied to this with uniform probability between 0–75 years: see inset top right).

age; all the other dates (on short-lived sample matter and one date on residue) should relate to the period of site use.

RESULTS

AMS dates obtained for this study and those previously published are presented in Table 1 and selected results of the Bayesian modeling are shown in Table 2. Results from the modelling for Roundtop, Sackett and Kelso are shown in relation to the IntCal20 radiocarbon calibration curve in Figures 8, 10, and 12; results for Maxon-Derby and Bates are shown as date plots illustrating the model structure in each case in Figures 9 and 11.

Roundtop: The Roundtop site is acknowledged to have experienced repeated occupation associated with multiple rebuilding episodes. Some of these may possibly be due to seasonal occupations on the shorter-term time-scale. But others seem to be different (and perhaps distinct) occupation periods over longer-term periods across a total period of as much as three centuries. Such repeated episodes (shorter-term and longer-term) may relate to the site's

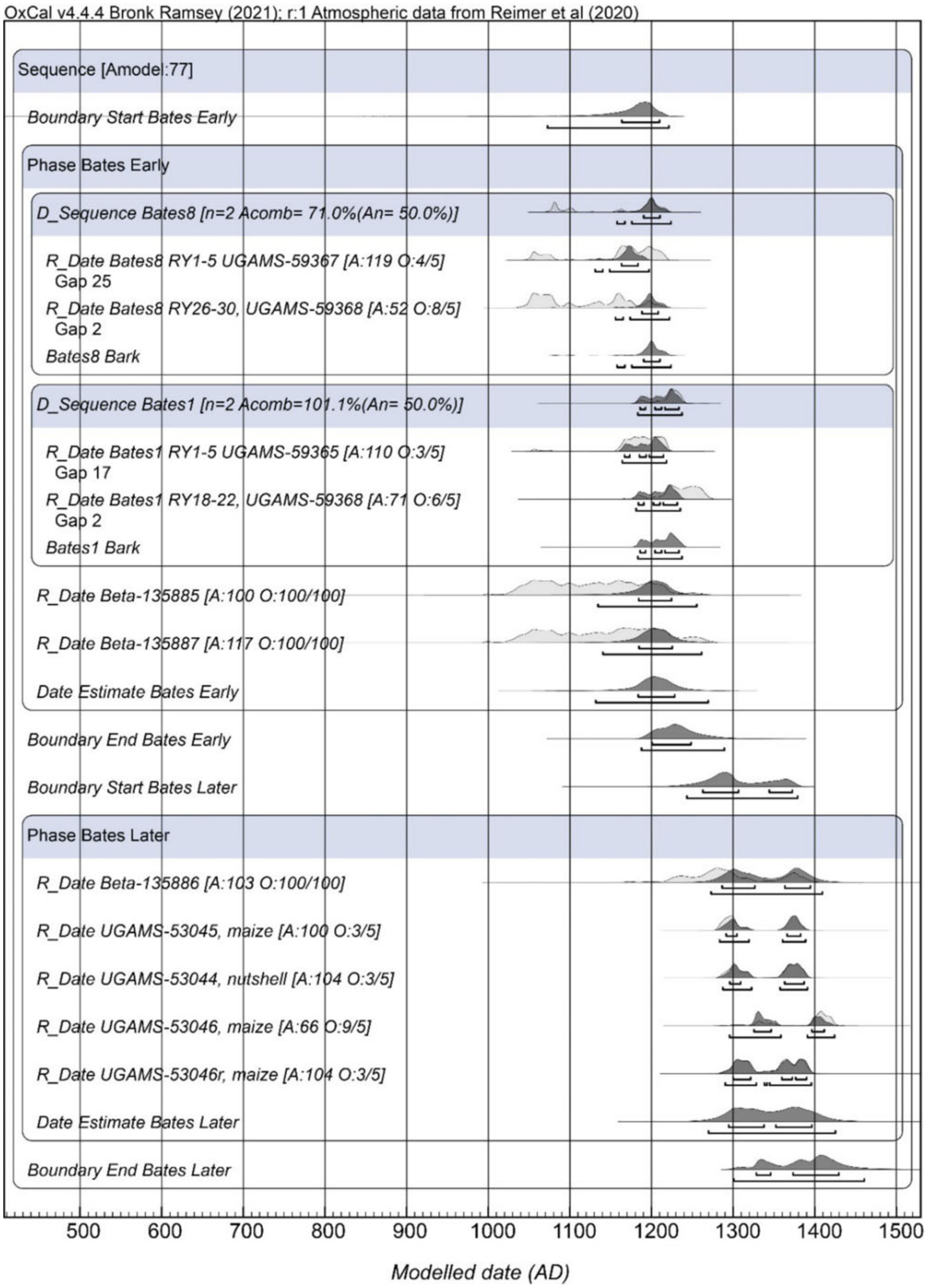

Figure 11 Bates model showing the model structure with modeled (dark solid distributions) and non-modeled (light gray probabilities) calendar probabilities (posterior densities) for the samples. The lines under each distribution show the 68.3% and 95.4% hpd ranges. A values indicate individual OxCal agreement values (should be ≥ 60) and the O values are Outlier model posterior/prior values (note for samples with the Charcoal Outlier model applied these are always 100/100, for the other samples the prior is a 5% outlier probability).

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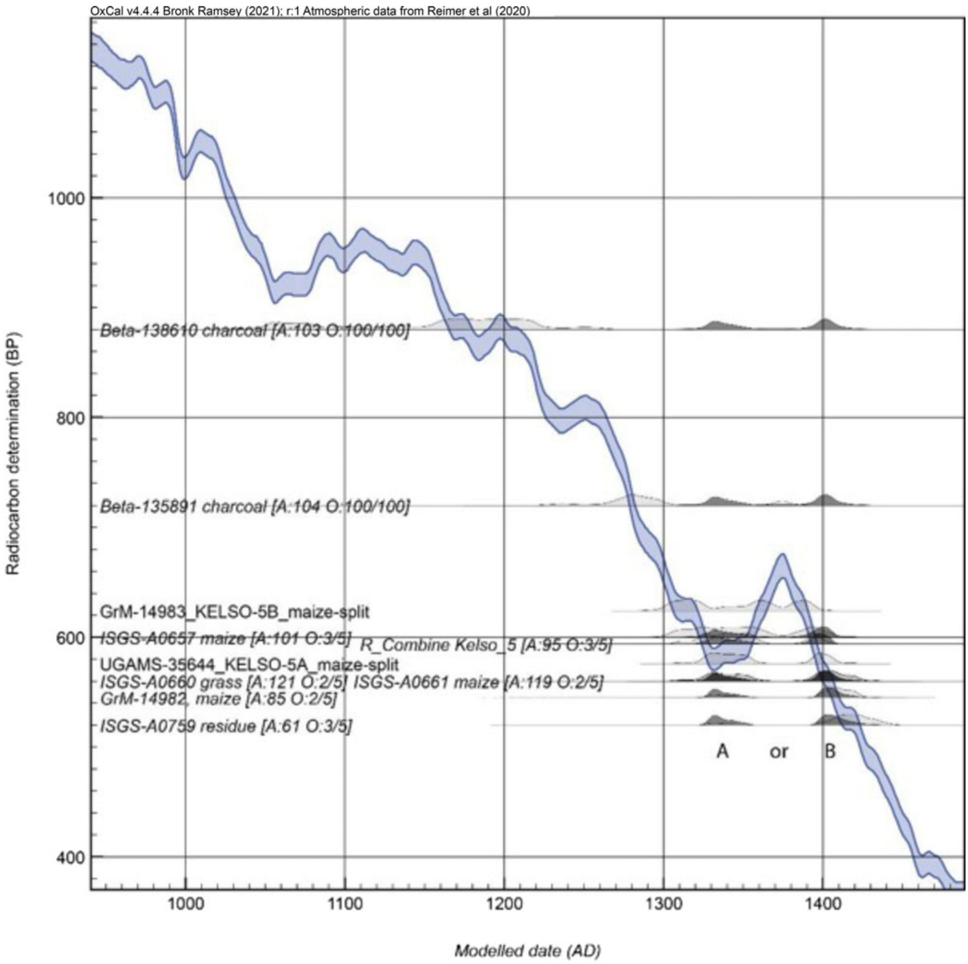

Figure 12 Modeled (dark solid distributions) and non-modeled (light gray probabilities) calendar probabilities (posterior densities) for Kelso shown placed against the IntCal20 radiocarbon calibration curve. There are two possible calendar positions, labeled as A and B. Position B visually offers a better correspondence (fit) of all the dates on short-lived samples onto the calibration curve and might thus be preferred. This suggests a site occupation in the decade or so before and following 1400—see further in main text and Figure 13.

location in a floodplain environment (Ritchie and Funk 1973:193; Trigger 1981:25). The grouping of radiocarbon dates into Phases associated with an early occupation and the occupation periods of Houses 1 and 2 reflect this scenario and indicate distinct periods of overall occupation and (as currently attested) non-occupation at the site overall across a span of several centuries between the later 12th through 16th centuries. If an approximate and likely reasonably plausible constraint on the lifetime of a single longhouse is applied to Houses 1 and 2 at the site (with uniform probability between 0–50 years), then the ambiguity in the dating of each of these houses is reduced and perhaps guides us to a most likely calendar placement: most likely 1360–1396 (62.2% hpd [highest posterior density]) or later 14th century for House 1 and 1469–1554 (68.3% hpd) or later 15th to mid-16th century for House 2 (see Table 2).

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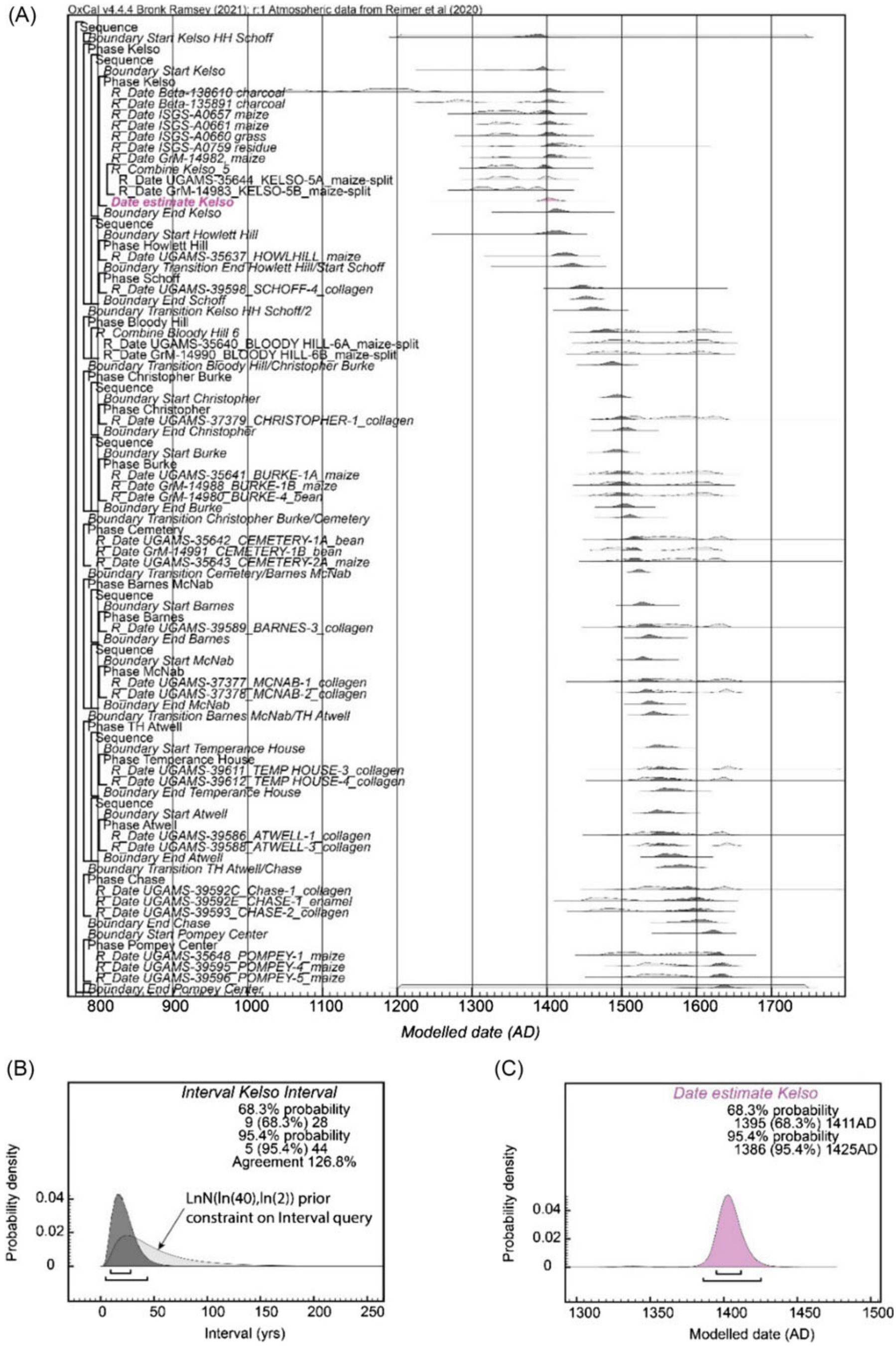

Figure 13 (A) The Kelso data and model in this paper (Figure 12) re-considered and run in the context of the larger Onondaga settlement Sequence presented in Birch et al. (2021) showing model elements and structure. This model uses the site Phases and the assumed site ordering set out by Birch et al. (2021). As explained in the main text, we vary (allow to be longer) the site Interval query constraint for the sites from the mid-15th century and older in this re-analysis. (B) Interval query versus prior assumption (the Kelso site Phase in fact appears to be relatively short). (C) Details of the Date query applied to the Kelso site Phase (the period of time between the start and end Boundaries for the site Phase).

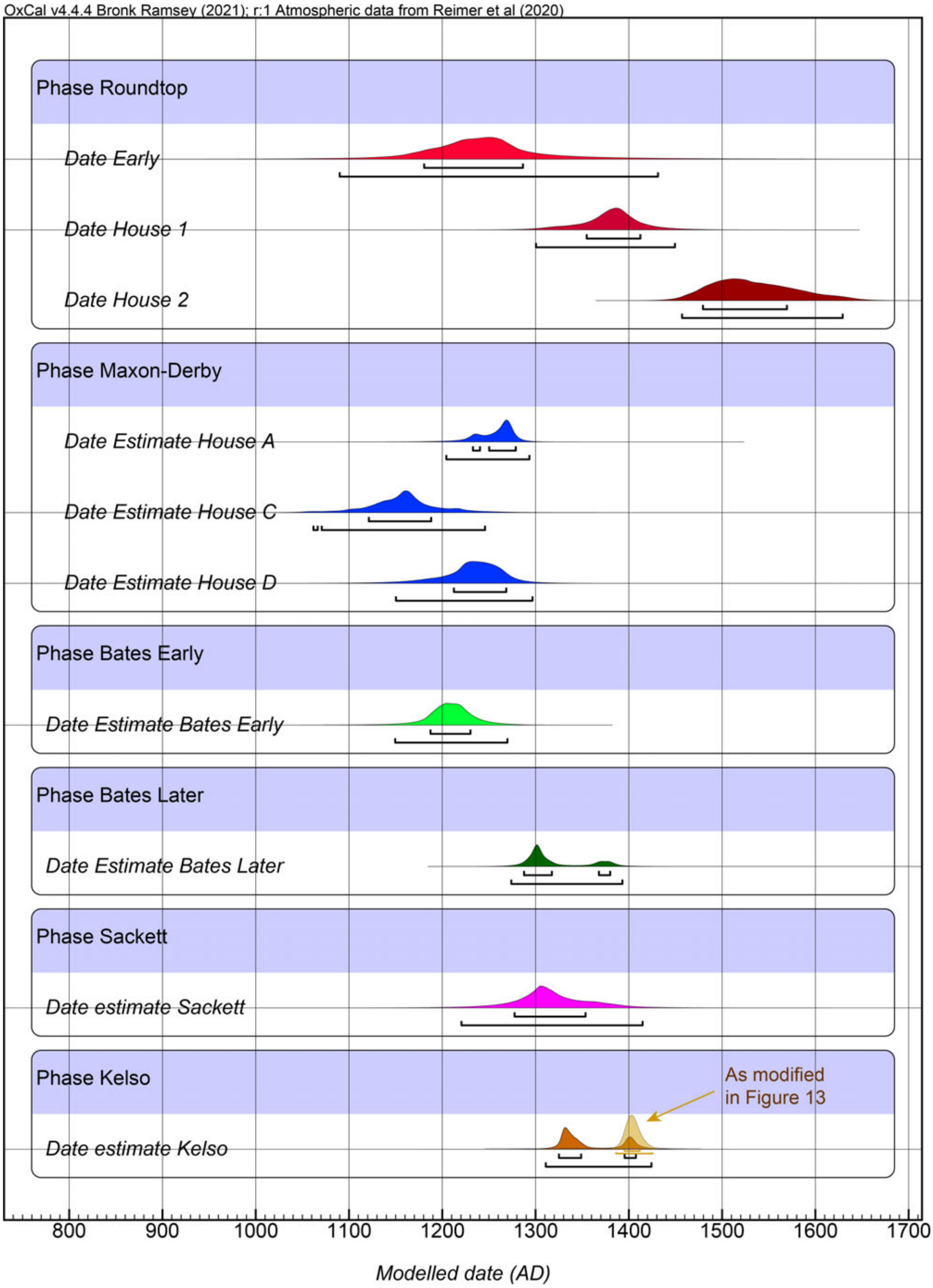

Figure 14 Selected elements (the Date queries) from the dating models for all five sites (see Figures 8–13) plotted together.

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Maxon-Derby: Date estimates were generated for the Maxon-Derby site as a whole, as well as for the individual houses with which samples were associated. The overall site occupation is modeled as occurring 1144–1280 (68.3% hpd). Houses C and D, the squarish houses located in the center of the site date to 1120–1189 and 1211–1269 (68.3% hpd), respectively, and House A dates 1233–1279 (total 68.3% hpd range). As evident in view of the dating model in Figure 9, there appears an earlier period of occupation in the 12th century (House C) and a later 13th century period of occupation (Houses A and D).

Bates: The Bates site appears to represent two distinct periods of occupation separated by a 13–100-year (68.3% hpd) Interval between earlier and later occupations. The first is probably in the late 12th–earlier 13th centuries and a second most probably in the late 13th–early 14th centuries. Given the data available, we cannot resolve the ambiguity in the later occupation period (whether earlier or later 14th century) (Figure 11, Table 2).

Sackett: The available data indicate site occupation in the later 13th through mid-14th centuries. Assuming one occupation episode reasonably compatible with all the data (from wood charcoal with in-built age to the shorter-lived samples), this probably lies on the slope in the radiocarbon calibration curve ending around 1350 and we may exclude otherwise possible later 14th century alternative ranges (see Figure 10).

Kelso: The modeled data from Kelso provide an ambiguous solution: either earlier-mid-14th century or around 1400. All the dates on short-lived samples fit well on the slope in the radiocarbon calibration curve either side of 1400 perhaps providing the better apparent fit (Figure 12, see option B). In either case, the two dates on wood charcoal must include substantial in-built age. To identify a likely resolution of this Kelso ambiguity, we may consider the additional Kelso data and site Phase model in terms of the Onondaga site Sequence (and assumptions made there) presented by Birch et al. (2021). We introduce one change, however: as evident in the cases of some of the earlier sites investigated in this paper, these can sometimes have longer site durations than the relatively short ca. 20–40 year occupations assumed for the late 15th through 17th centuries based on ethnohistoric (e.g., historic accounts of village occupation and relocation) and archaeological information (e.g., identification of ecological factors influencing settlement lifespan; estimating village duration based on wood decay curves) (Jones and Wood 2012; Warrick 2008) and as demonstrated through accordingly short modeled site Phases in radiocarbon-based studies (see Birch et al. 2021). Thus for those sites dating from the mid-15th century and older (Bloody Hill and older in the Onondaga Sequence), we change the assumed constraint on an Interval query for the site duration from the later period assumption of LnN(ln(20),ln(2)) (see Manning et al. 2020; Birch et al. 2021) to instead a potentially much longer assumption of LnN(ln(40),ln(2)). This constraint assumes a site duration median of 40 years and 68.3% hpd range (rounded) of 10–59 years and 95.4% hpd range (rounded) of 5–130 years. Running this revised Onondaga Sequence finds clearly in favor of a Date estimate for Kelso around 1400 (1395–1411 at 68.3% hpd): see Figure 13.

DISCUSSION

The revised date estimates for these five classic "early" village sites in New York suggest that there was both continuity and discontinuity in the transition to settled village life in the twelfth through fourteenth centuries in this region (see Figure 14 for the elements of all five sites discussed above plotted together).

Early Iroquoian sites have been acknowledged to have been occupied for longer spans of time—up to a century or more—than later, larger villages practicing an intensive agricultural way of life. The latter is generally considered represented by multiple sequential occupations and associated rebuilding (Timmins 1997; Warrick 2008). Nevertheless, even allowing for longer single-locus occupation in the earlier period, the repeated occupation of the Roundtop site is somewhat unique in the Iroquoian archaeological record. The repeated re-use and rebuilding of longhouses at this site, with occupations dating to the twelfth-thirteenth centuries, the later fourteenth century, and the fifteenth to mid-sixteenth centuries suggests that the river terrace the site occupies was a place of remarkable persistence over a very long time and likely this place and area came to be imbued with considerable social meaning and significance. It has been noted that multi-component, multiple-use sites like Roundtop and the nearby Engelbert site are insufficiently accounted for in the creation of New York's early to mid-twentieth culture history scheme and are even less explained by it (Biesaw 2010). It may also have been the case that Roundtop and perhaps Bates—which was also reoccupied following a likely multi-decadal abandonment—were sites of niche construction whereby the cultural creation and modification of the local ecology served as an attractant, resulting in repeated patterns of re-use (Crawford 2014; Terrell et al. 2003).

The Maxon-Derby, Kelso, and Sackett settlements include a mix of small, rectangular or ovoid structures and incipient or true longhouses (typically considered as such when they are at least twice as long as they are wide). At Maxon-Derby, the radiocarbon dates suggest a construction sequence beginning with the small, rectangular Houses C and D, with House D continuing to be occupied concurrently with House A (a small longhouse), and both of the latter being at least partly contemporary during the early thirteenth century. While the proliferation of post molds at the Sackett site was originally interpreted as small, round structures (Ritchie and Funk 1973), if later interpretations of the same as portions of longhouses are believed (Snow 1980:313; Trigger 1981:12), and especially those based on quantitative analysis rather than "eyeballing" arrangements of settlement patterns (Prezzano 1988), then this site also indicates the emergence of longhouse-based village life during the 13th century. The expanding nature of the longhouse at Bates during the late twelfth-thirteenth centuries also fits this pattern, suggesting a smaller structure that was expanded over time into a true longhouse form. Dates on short-lived material distributed across the Kelso site cluster firmly in the later fourteenth-to-early fifteenth century. This includes contexts from areas with both small, ovoid and rectangular structures and very long "true" longhouses. As has been suggested for the mid-fifteenth century Joseph-Picard (Micon et al. 2021) and late sixteenth to early seventeenth century Jean-Baptiste Lainé (Mantle) (Manning and Birch 2022) sites in Ontario, it may be that these smaller structures were temporary or impermanent, possibly being used to host guests to the community in a highly visible location (Micon et al. 2021; Birch and Williamson 2013:74). However, we would not expect that to be the case at Maxon-Derby, where the small rectangular and ovoid structures and certainly House C (with evidence of rebuilding) give every indication of being dwellings. The relationship between longhouses and non-longhouse structures during this period is clearly more complex than models favoring linear evolution from smaller to larger house forms would assume.

The presence of defensive fortifications or enclosures at Sackett, Bates, and Kelso suggests that the fourteenth century was either a period of heightened tensions or at least one where people felt the need to enclose their habitations (Ramsden, 1990). The recovery of six sets of male remains from the Sackett site bearing projectile points embedded in bone and lodged in soft

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tissue confirms that conflict was something that at least this community contended with (Ritchie 1936:57). In the Sackett case, an uptick in the actual or potential increase in conflict is likely related to the movement south of populations originating in southern Ontario (Emans 2007:250). Evidence for conflict is more present in the early Iroquoian southern Ontario archaeological record in the form of human bone artifacts and double-row palisades at some sites (Jenkins, 2015). The in-filling of the landscape likely contributed to the incipient formation of clusters of variously cooperating and contentious community groups as populations grew and became emplaced in a landscape experiencing both territorialization and social realignment and requiring the development of new institutional arrangements both locally and at a distance (Niemczycki, 1984; Feinman and Neitzel 2023).

CONCLUSION

These new dates on the evolution of village life in New York are especially relevant when considered in the wider context of the history of village development in the larger incipient Northern Iroquoian world. For example, recent efforts to re-date early Iroquoian occupation of southwestern Ontario suggest that the transition from seasonally occupied base camps to permanent villages with palisades and consisting primarily of longhouses was more or less complete in southwestern Ontario by the early 13th century (Connolly et al. in prep). However, gaining a clearer picture of early village development in northeastern North America requires a concerted and systematic research effort aimed at obtaining absolute dates associated with the development of early village life in the North American northeast and bringing those dates into dialogue with current assumptions, knowledge, and resources, both conceptual and technical (Wylie 2017).

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COMPETING INTERESTS STATEMENT

All authors contributed to the design of the work; the acquisition, analysis, or interpretation of data for the work; drafting and revision; and approved the final version of the work.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit https://doi.org/10.1017/RDC.2024.10

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