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NEW PERSPECTIVES ON MIMBRES ARCHAEOLOGY



Three Millennia of Human Occupation in the North American Southwest

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CONTENTS

Introduction: New Perspectives on Mimbres Archaeology 3
BARBARA J. ROTH, PATRICIA A. GILMAN, AND ROGER ANYON

1. First Farmers of the Mimbres Region 24
CHRISTOPHER A. TURNBOW, JOHN R. RONEY, AND ROBERT J. HARD

2. Changing Perspectives on Pithouse Period Occupations in the Mimbres Region 48
ROGER ANYON AND BARBARA J. ROTH

3. Making the Transition: Using New Data to Reassess the Mimbres Pithouse-to-Pueblo Period 64
JAKOB W. SEDIG, STEPHEN H. LEKSON, AND BARBARA J. ROTH

4. Mimbres Classic Period Architecture, Ceramics, and Religion: Maintaining Social Cohesion in the Face of Social Diversity 88
PATRICIA A. GILMAN, DARRELL CREEL, AND THOMAS E. GRUBER

5. Small Pueblo Sites of the Mimbres Classic Period: New Views and Interpretations 108
ROBERT J. STOKES, AARON R. WOODS, AND ELIZABETH TONEY

6. Mimbres Pottery: New Perspectives on Production and Distribution 132
DARRELL CREEL AND ROBERT J. SPEAKMAN

7. Mimbres Pottery Designs in Their Social Contexts 149
MICHELLE HEGMON, JAMES R. MCGRATH, F. MICHAEL O'HARA III, AND WILL G. RUSSELL

8. Variability in Mimbres Food and Food Procurement 169
KAREN GUST SCHOLLMEYER, MICHAEL W. DIEHL, AND JONATHAN A. SANDOR

9. Continuity and Change in the Eastern Mimbres Area After A.D. 1130 193
KAREN GUST SCHOLLMEYER, MARGARET C. NELSON, AND MICHELLE HEGMON

10. Continuity and Change in the Early Postclassic (A.D. 1130 to 1300) in the Mimbres Valley 209
KATHRYN PUTSAVAGE AND MATTHEW TALIAFERRO

11. Connectivity of Social Change in Mimbres and Points South 232
BEN A. NELSON AND PAUL E. MINNIS

12. The Mimbres Foundation in the History of Nonprofit Archaeology 248
WILLIAM H. DOELLE

13. Thoughts on Mimbres Archaeology 261
STEVEN A. LEBLANC

Contributors 273
Index 281

NEW PERSPECTIVES ON MIMBRES ARCHAEOLOGY

1

First Farmers of the Mimbres Region

CHRISTOPHER A. TURNBOW, JOHN R. RONEY,
AND ROBERT J. HARD

IN THE DECADES SINCE the Archaic syntheses conducted by Minnis (1980) and Lekson (1992), archaeologists have generated important new data on preceramic farming societies in the Mimbres region, centered on the Mimbres and upper Gila River drainages of southwestern New Mexico (figure 1.1). Research now challenges the old paradigm that Archaic populations continued a seasonally mobile hunting and foraging lifestyle until around A.D. 200 (Anyon and LeBlanc 1984; LeBlanc 1983; Minnis 1980). Instead, the introduction and intensification of maize farming among these groups led, at least at times, to reduced mobility, new technologies, and profound transformations to their social structure.

This chapter examines the accumulating archaeological evidence for preceramic farmers in the Mimbres region during the late Middle Archaic and Late Archaic periods and considers how farming influenced the cultural fabric of these populations. We use the term *Early Agricultural*, as defined by Huckell (1996), to classify these groups. We argue that early farming began in the region by at least 2000 B.C. and that some populations may have reached the tipping point from incipient to more intensive farming at least a millennium before the Early Pithouse period.

Early Agricultural Research in the Mimbres Region

Early Agricultural period populations in the Mimbres region left behind a rich cultural landscape that reflects their changing land-use patterns and social organization in response to food production. Yet the period has received scant attention compared

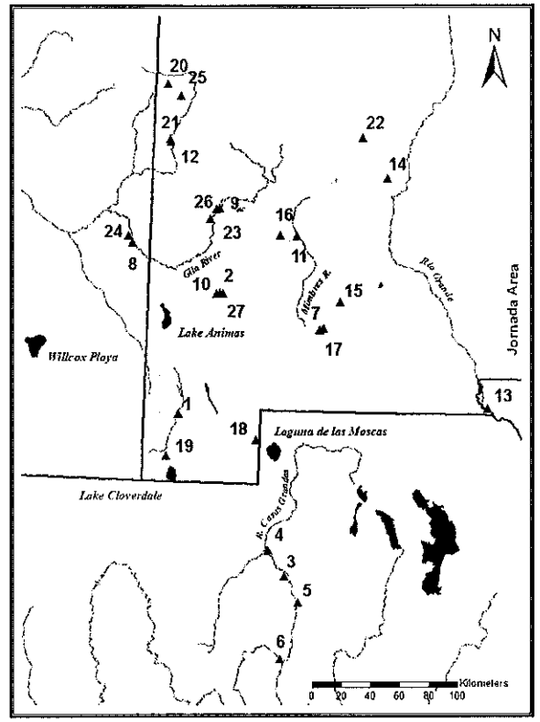


FIGURE 1.1 Archaic sites discussed in this chapter: 1. Animas Cienega, 2. Beargrass, 3. Cerro El Canelo, 4. Cerro Juanaqueña, 5. Cerro Los Torres, 6. Cerro Vidal, 7. Duke, 8. Duncan Donut, 9. Eaton, 10. Forest Home, 11. Harris, 12. HO-Bar (WS-17), 13. Keystone Dam, 14. LA 53488, 15. LA 75993, 16. LA 107539, 17. LA 159879, 18. LA 162023, 19. Lake Cloverdale, 20. Luna sites, 21. Mogollon village, 22. Monticello Canyon and Victorio Arroyo, 23. Ormand, 24. Round Mountain, 25. SU, 26. Winn Canyon, 27. Wood Canyon. The shading is the Mimbres core area as used in this chapter.

with archaeological investigations in the adjacent Jornada (Miller 2018) and southeast Arizona (Mabry 2005a) regions.

Research in the Mimbres region from the 1930s to the 1950s focused on establishing culture histories of the ceramic periods but did report on aceramic bell-shaped storage pits, middens, and artifacts that would later be recognized as associated with the Archaic and Early Agricultural periods (Cosgrove 1947; Haury 1936; Martin et al. 1949). The development of the three-stage Cochise Complex in nearby southeastern Arizona offered a temporal framework to examine changes in forager populations, but Archaic maize farming was not confirmed until the 1940s and 1950s with excavations and later

reanalyses of stratified deposits at Bat Cave and other sites in the Mogollon Highlands north of the Mimbres region (Dick 1965; Martin et al. 1952; Wills 1988a, 1988b, 1989).

The advent of cultural resource management projects and increased university research led to the excavation of more Archaic components in the Mimbres region in the 1960s and 1970s. Early highway salvage excavations revealed Archaic deposits at Gila Hot Spring, reported at the time as a Cochise San Pedro phase camp (Honea 1963), and at Ormand, a Salado phase village overlying eleven purportedly aceramic pit structures (Hammack et al. 1966; Wallace 1998). Fitting of Case Western Reserve University conducted research on the transition from the Archaic to the Early Pithouse period in the Gila River drainage. His excavations targeted the Eaton site, a Late Archaic settlement (Hemphill 1983), and nearby Winn Canyon, an Early Pithouse site that also produced a possible Late Archaic structure (Fitting 1973). Collectively, these projects were plagued by a lack of time, money, or methods to systematically recover botanical remains. Although the sites may contain cultigens, few, if any, archaeobotanical samples were collected, and the presence of maize at these Archaic components remains unconfirmed.

Since the 1980s, detection of preceramic farming sites has greatly benefited from new technologies for the extraction, identification, and interpretation of plant remains and the direct accelerator mass spectrometry (AMS) dating of maize. With these new tools, research-driven excavations began to generate a wealth of new data on the Early Agricultural period in the Mimbres region. Investigations by universities and foundations specifically targeted Archaic midden sites in the Bootheel of New Mexico (Roney et al. 2012) and the Black Range (Laumbach 2013, 2014, 2015), as well as *cerros de trincheras* sites along the Gila River (Roney et al. 2015) and on the southern border of the Mimbres region (Hard and Roney 1998, 1999, 2005). University excavations at later Pithouse period sites have also revealed late Middle Archaic and Late Archaic components at WS-17, also known as the HO-Bar site (Neely and Brunnemann 1988; Peck 1991); Mogollon village (Linse 1997; Mauldin et al. 1996); and SU (Wills 1988a, 1989). Cultural resource management projects have documented Archaic occupations across diverse geographic settings and have conducted large-scale excavation and analysis of Archaic components that would not otherwise have been studied (Brown 1998; Chapman et al. 1985; Duran and Manning 1993; Jones et al. 2012; Kirkpatrick 2016; Kugler 1994; Kurota and Cohen 2009; Lentz et al. 2013; Oakes and Zamora 1999; Turnbow et al. 2000).

Chronology

Despite increased research on the Early Agricultural period, tight chronological frameworks for these first farmers have yet to be established for the Mimbres region.

Of the 547 Archaic sites currently listed from southwestern New Mexico in the New Mexico Archaeological Records Management System, only 43 have received even limited excavation, and fewer have botanical studies. Deeply stratified alluvial and rockshelter sites suitable for chronology building are rare, and a paltry 134 radiocarbon determinations exist for the entire Archaic sequence. This stands in sharp contrast to the 3,295 radiocarbon dates from Archaic and Early Formative sites in the Jornada region or the numerous extensively excavated sites in the Tucson Basin. As a consequence, archaeologists have simply assigned Early Agricultural components to the Middle and Late Archaic periods based on diagnostic projectile-point types and radiocarbon dates or have borrowed phase-based temporal sequences defined in southeastern Arizona (Mabry 2005a; Sayles 1983; Sayles and Antevs 1941) and south-central New Mexico (Lehmer 1948; MacNeish and Beckett 1987; Miller 2018; see table 1.1 for a comparison of Mimbres, Jornada, and southeastern Arizona chronologies).

Indeed, the southeastern Arizona Late Archaic San Pedro and Cienega phases are applicable in the western Mimbres region of the Gila River drainage and the Bootheel area, while the material culture and settlement patterns from the southeastern portion of the Mimbres region closely parallel the Jornada Archaic phase sequence. Unfortunately, given the paucity of Early Agricultural period research over most of the Mimbres region, it is difficult to correlate either sequence through much of the Mimbres basin country or the mountainous area to the north.

Given these problems, the Early Agricultural period discussed in this chapter is divided into three broad temporal horizons that are roughly contemporaneous with the defined phases to the east and west. The periods include the introduction of maize during the late Middle Archaic (2000–1300 B.C.), the rise of incipient farming during the early Late Archaic (1300–800 B.C.), and intensified farming during the late Late Archaic (800 B.C.–A.D. 150/175), ending with the general appearance of large well-made cooking and storage ceramic vessels. Unless otherwise noted, all specific site dates cited in this chapter are calibrated using InCal13 and presented as two-sigma ranges or the calibrated intercept.

Late Middle Archaic Period (2000–1300 B.C.)

Over much of the southern Southwest, the Middle Holocene interval between 5500 and 2500 B.C. witnessed heightened aridity associated with greater temperatures and less effective precipitation than at present (Mabry and Stevens 2014). For the Mimbres region, those harsh conditions may have supported only sparse populations that left very few archaeological components. Greater effective moisture and lower temperatures during the ensuing interval of 2000 B.C. to B.C./A.D., however, caused populations to be drawn to the reliable water and rich biotic resources around ciénegas, floodplains, and other alluvial settings. It was during this period that Doolittle

TABLE 1.1 Early Agricultural Chronology of the Southern Southwest United States

		Jornada Mogollon	Mimbres	Southeastern Arizona
Late Holocene (2500 B.C.–present)				
Late Archaic	A.D. 300			
	A.D. 200			
	A.D. 100	Hueco		
	A.D./B.C.			
	100 B.C.			
	200 B.C.			
	300 B.C.		late Late Archaic	Cienega
	400 B.C.			
	500 B.C.	Arenal		
	600 B.C.			
	700 B.C.			
	800 B.C.			
	900 B.C.			
	1000 B.C.			
	1100 B.C.	Fresnal	early Late Archaic	San Pedro
	1200 B.C.			
	1300 B.C.			
	1400 B.C.			
	1500 B.C.			
	1600 B.C.		late Middle Archaic	Unnamed
	1700 B.C.			
	1800 B.C.			
	1900 B.C.			
Middle Archaic	2000 B.C.	Keystone		
	2100 B.C.			
	2200 B.C.			
	2300 B.C.			
	2400 B.C.			
	2500 B.C.			
Middle Holocene (5500–2500 B.C.)				

Source: Miller 2018 (Jornada); Mabry 2005a (southeastern Arizona)

and Mabry (2006) have suggested conditions allowed the Middle Archaic foragers to reduce mobility and possibly begin cultivating native plants and cultigens in an incipient form of farming.

The earliest evidence of maize in the North American Southwest occurs around 2600 to 2200 B.C. in the Arizona desert, the Mogollon Highlands, and the Colorado Plateau (Gregory 1999, 2001; Huber 2005; Huckell 2006; Mabry 2005a; Merrill et al. 2009). Initially, people simply incorporated maize into the existing subsistence-settlement system and farmed on floodplains and alluvial fans using flood and water-table farming practices (Mabry 2005b; Wills 1988b). Pepo squash was added sometime prior to 1200 B.C. (Merrill et al. 2009).

Occupations between 2200 and 1200 B.C. in southeastern Arizona (Mabry 2005a) and the contemporaneous Keystone phase (2500–1200 B.C.) in the Jornada region (Miller 2018) developed during these more favorable climatic conditions. Both are marked by significant increases in sites and features and the appearance of the first village settlements. While the Arizona sites showed evidence of incipient farming, poor preservation of plant remains at the Keystone phase site near El Paso, Texas, limited their value for assessing farming activities. Currently, evidence for farming comes from just a single feature from Keystone 33, where maize pollen was associated with a date of 2085 to 1895 B.C.

Contemporaneous occupations in the Mimbres region are only vaguely known, primarily recognized by Middle Archaic San Jose/Pinto, Gypsum contracting stem, and Cortaro dart points. Site numbers do dramatically increase over the preceding Early Archaic components with concentrations in the vicinity of lake shorelines (Formby 1986:102; Roney et al. 2012; Turnbow et al. 2008). These sites vary in size but have produced grinding implements, diagnostic dart points, and cutting and scraping tools. One of the largest sites, located along Lake Cloverdale, was a likely base camp strategically situated next to a fertile alluvial fan suitable for early farming endeavors (Turnbow et al. 2008).

The earliest dated maize in the Mimbres region came only a few centuries after its initial appearance in the Southwest. Laumbach (2013, 2014) reported direct AMS dates of 1925 and 1973 B.C. on maize recovered during test excavations near the Montoya site (LA 88891), located on Cañada Alamosa in the Black Range (table 1.2). Maize production in this well-watered tributary of the Rio Grande is probably not an isolated occurrence. Unfortunately, few Middle Archaic sites have been excavated, and besides the Montoya dates, only ten radiocarbon determinations from four sites fall between 2200 and 1300 B.C. Cerro Juanaqueña, located on the southwestern edge of the Mimbres region in northern Chihuahua, had six AMS dates on maize with intercept dates in the decades before 1300 B.C. (to be discussed in more detail) and another date on a *Cucurbita* seed of 1745 to 1450 B.C. The HO-Bar site (WS-17)

TABLE 1.2 Pre-ceramic Radiocarbon Dates on Maize or Maize Contexts from the Mimbres Region

Site Name/Number	^{14}C Age[a]	Cal B.C./A.D. Range[b]	Number of Dates	References
Beargrass	1840±50	A.D. 60–330	1	Turnbow et al. 2000
Wood Canyon (late)	2000±60	170 B.C.–A.D. 125	1	Turnbow et al. 2000
Cerro Vidal	2100±40	345 B.C.–A.D. 0	1	Hard and Roney 1999
Harris	2170±30	360–120 B.C.	1	Roth 2015
Duncan Donut	2150±30	360–60 B.C.	1	Roney et al. 2015
Cerro Juanaqueña	2140±40 to 2315±60	360–180 B.C.	3	Hard et al. 2001
Forest Home	2270±40 to 2240±50	390–210 B.C.	3	Turnbow et al. 2000
Duke	2330±40	540–230 B.C.	1	Kirkpatrick 2016
Alamosa Canyon	not available	740–440 B.C.	1	Laumbach 2015
Cerro Vidal	2340±55	745–210 B.C.	1	Hard et al. 2001
SU	2290±110	760–90 B.C.	1	Wills 1989
LA 159879	2460±30	760–430 B.C.	1	Lentz et al. 2013
LA 53488[c]	2360±80	770–210 B.C.	1	Kugler 1994
Wood Canyon (early)	2650±50 to 2480±40	805–770 B.C.	3	Turnbow et al. 2000
Cerro Los Torres	2920±55	1275–935 B.C.	1	Hard and Roney 1999
Cerro Juanaqueña	2870±50 to 3080±70	1280–1130 B.C.	13	Hard et al. 2001
Animas Cienega[c]	3030±80	1450–1030 B.C.	1	Davis et al. 2002
Cerro Juanaqueña	3130±55	1540–1255 B.C.	1	Hard et al. 2001
Montoya	3610±30	2110–1890 B.C.	2	Laumbach 2013, 2014
	3640±30	2135–1920 B.C.		

[a]Conventional ^{14}C age B.P. If multiple dates were available, both upper and lower bounding maize dates are given.
[b]Two-sigma calibrated dates using OxCal 4.2.
[c]Dated deposits containing maize.

yielded a single date from this period with such large standard errors that its significance is questioned (Neely and Brunnemann 1988). Two other dates were obtained from short-term camps characterized by a few extramural roasting and fire pits (Oakes and Zamora 1999). These two components produced no evidence of cultigens, large storage pits, or associated structural remains.

Early Late Archaic Period (1300–800 B.C.)

Beginning around 1300 B.C., both the San Pedro phase (1200–800 B.C.) of southeastern Arizona (Huckell 1996; Mabry 2005a) and the Fresnal phase (1300–700 B.C.) of the Jornada region (Miller 2018) were characterized by the expansion of settlements and an increased use of maize. Miller, however, considers maize farming only a minor component in the Fresnal phase economy, and Diehl (2005) refers to the San Pedro populations as "farmagers" since a greater portion of their subsistence base was still derived from foraging.

The use of the term *San Pedro phase* seems applicable across the western half of the Mimbres region. Miller (2018:138) also contends that "similarities in the timing of broad-scale subsistence trends and technological traits suggest the Jornada could be considered an eastern correlate and variant of the San Pedro phase and Early Agricultural period of the southern Southwest." San Pedro settlements exhibit middens with an abundance of fire-cracked rock and artifacts, shallow oval pit structures, hearths and large bell-shaped storage pits, burials, San Pedro projectile points, and, at least in southeastern Arizona, ceramic figurines and the first appearance of incipient ceramic wares (Heidke et al. 1998; Huckell 1996; Roth 2014).

In the Mimbres region, this period is best recognized by an abundance of San Pedro points in both camps and larger midden sites, but excavations are rare and we currently have little evidence of farming. Only sixteen radiocarbon determinations from six sites date to this period. Three components are camps containing roasting and fire pits (Jones et al. 2012; Oakes and Zamora 1999). Three other thick aceramic middens that appear to have their origins during this period include LA 53488, situated along the Cuchillo Negro Creek in the Black Range (Kugler 1994); LA 162023, located in the Bootheel just west of Laguna de las Moscas (Roney et al. 2012); and LA 159879, along the Mimbres River near Deming. While the first two are primarily known from exploratory excavations, more intensive highway excavations at LA 159879 produced three separate Late Archaic components, including two dating between 1000 and 800 B.C. that revealed shallow pit structures and thermal features. The midden sites are located adjacent to reliable water and arable land. Even so, no evidence of maize production, large storage pits, or incipient ceramics has yet been identified, although LA 159879 produced cotton pollen in deposits dating between 835 and 795 B.C. (Lentz et al. 2013).

However, indirect evidence of maize farming does occur at the Animas Creek ciénega in the southwesternmost corner of New Mexico. Core samples from the ciénega revealed maize pollen associated with a radiocarbon determination of 1270 B.C. (Davis et al. 2002). Although the relationship between the pollen and the date is tenuous at best, it suggests that farming may have been practiced along Animas Creek at this time.

Much stronger evidence of farming has emerged from the cerros de trincheras sites located only 65 km southwest of Animas Creek in northern Chihuahua (Hard et al. 2008; Hard and Roney 1998, 2005, 2007; Hard et al. 2001; Roney and Hard 2002, 2003, 2004). This distinctive site type is characterized by complexes of hill terraces, rock rings, and stone walls. Cerro Juanaqueña and three other cerros de trincheras sites in northern Mexico were occupied over two brief episodes during the Early Agricultural period. The earlier and most intensive lasted for approximately two hundred years from 1300 to 1100 B.C. Hard and Roney (1998, 2007) postulate that farming populations had existed in the adjacent fertile valleys until around 1300 B.C., when the settlements shifted to hilltop locations.

Cerro Juanaqueña, the largest known example of this site type, is a 10 ha aggregated settlement with 99 rock rings and 550 terraces representing almost 8 km of wall. Mostly constructed on the upper third of the hillslope, the rock rings are interpreted as dwellings with circular or oval configurations and a mean diameter of 2.63 m.

Although faunal and wild plant resources were important subsistence resources, maize was a significant dietary staple at Cerro Juanaqueña. It occurred in 51 percent of the flotation samples, including sterile samples ($N = 157$). Cheno-am was the next most frequent charred taxon, including both nondomesticated *Chenopodium* and possibly domesticated amaranth (Hard et al. 2008; Hard and Roney 2005). Some rock rings on the summits of these hills may have been footings for aboveground storage facilities.

Construction of these cerros de trincheras sites implies a degree of sedentism, community organization and planning, and a large population. Hard and his colleagues (1999) suggest that thirty person-years of labor was needed to construct Cerro Juanaqueña, and life on these hilltops, some rising to 150 m above the surrounding landscape, required considerable caloric expenditures to support the occupations. Based on a worldwide cross-cultural study of forty-two ethnographic groups, as well as other arguments, Hard and Roney (2007) conclude that this commitment was almost certainly motivated by concerns about raiding and warfare (also see McGuire and Villalpando 2015).

Late Late Archaic Period (800 B.C.–A.D. 150/175)

The last Early Agricultural occupations in the Mimbres region are characterized by a significant increase in more sedentary residential settlements and the widespread

presence of maize (see table 1.2). When excavated, these settlements have shallow oval or circular pit structures, roasting and fire pits, large-capacity storage pits, and burials. Supported by a mixed farming, gathering, and hunting economy, these communities were established near well-watered, arable lands in mountain highlands, river valleys, and desert basins. Collectively, they reflect reduced mobility; increased labor investments for the construction of large storage pits, structures, and mortuary facilities; and fundamental changes in social organization and technology that in part reflect the intensification of maize in the diet.

The current sample of seventy-six radiocarbon determinations for this period is derived from thirty sites. Of those, fifty-six dates are from nineteen middens that could represent residential farming sites and repeatedly occupied logistical procurement camps. The remainder are from seven small camps with roasting or fire pits and three brief camps with ephemeral structures.

In terms of cultural traits, sites on the western half of the Mimbres region easily fall into the Cienega phase (800 B.C.–A.D. 50) as defined by Huckell (1995) and Mabry (2005a). Tool assemblages include Cienega and San Pedro dart points, oval or circular one-hand manos, basin-shaped metates, and rare cruciforms and ground-stone vessels (bowls, trays, mortars) like those identified on Cienega phase sites in southeastern Arizona and northern Sonora (Ferg 1998; Hemphill 1983; Huckell 1995; Huckell et al. 1995; Knight 2003; Mabry 1998; Turnbow et al. 2000; Wallace 1998).

Phase affiliations for the rest of the Mimbres region are less clear, although components in the southeastern area may fit into the Jornada Arenal (700–200 B.C.) and Hueco (200 B.C.–A.D. 300/500) phases defined by Miller (2018) and earlier researchers (Lehmer 1948; MacNeish 1993; MacNeish and Beckett 1987). Miller (2018:133) has described the Arenal phase as "distinctly non-agricultural" with a marked reduction in the evidence of maize, a decline in radiocarbon dates and plant-baking pits, and a shift in settlements to playa basins. By 200 B.C., however, Miller contends that southeastern Arizona and the Jornada were similar in terms of the use of maize, the expansion and intensification of settlements, and population growth.

SETTLEMENTS While it may be premature to discuss population demographics for this period, intensive midden-forming occupations are more common than during the previous period (table 1.3). They appear to be particularly concentrated in the Gila River drainage (Duncan et al. 1991; Fitting 1973; Hammack et al. 1966; Hemphill 1983; Lekson 1992; Linse 1997; Mauldin et al. 1996; Roney et al. 2015; Wallace 1998; Wills 1988a, 1995). Although not excavated or dated, eighteen purportedly aceramic pithouse sites documented during a survey of Gila River tributaries also suggest increased residential densities (Chapman et al. 1985). Nearby in the Big Burro Mountains, four farming settlements of this period were discovered during excavations

along a 9 km highway improvement project (Turnbow et al. 2000). Other midden sites have been excavated in the Mimbres Valley (Brown 1998; Kirkpatrick 2016; Lentz et al. 2013), along tributaries of the Rio Grande in the Black Range (Kugler 1994; Laumbach 2015), along Cooks Canyon at the base of Cooks Peak (Duran and Manning 1993), and in the Bootheel in the southwestern corner of New Mexico (Kurota and Cohen 2009; Roney et al. 2012).

Excavations of these middens, when combined with robust archaeobotanical sampling and budgets, often reveal evidence of at least semisedentary residential occupations with maize, community planning, and increased labor investments for the construction of structures, storage facilities, and burials. Among the more fully excavated farming settlements of this period are the Forest Home and Wood Canyon sites in the Big Burro Mountains, the latter containing spatially discrete components. These settlements had small pit structures surrounded by large extramural bell-shaped or cylindrical storage pits and ground-stone caches, all associated with thick (0.3–0.6 m) cultural deposits and dense concentrations of burned rock and artifacts (Turnbow et al. 2000). Burials were either interred in recycled storage pits or in more elaborate facilities near the edge of the components. Hearths and small roasting pits were more widely scattered. Based on direct AMS dates of annual seeds, including maize, the settlements date from around 805 B.C. to probably no later than A.D. 200 (see table 1.2).

Intensified farming implies reduced mobility and increasingly complex land-tenure systems and territories. Control over prime farmland and stored foods, as well as changing natural conditions (climate, food resources) and social factors (sociocultural values, political ideology, population trends), likely led to increased tension and hostilities in the Mimbres region. This may be the case for the construction or reoccupation of cerros de trincheras sites in northwestern Chihuahua and the Gila River drainage between 500 and 150 B.C. (Hard and Roney 2007; Roney et al. 2015). If such sites were defensive in origin as proposed by Hard and Roney (2007), then cerros de trincheras sites like Round Mountain (Roney et al. 2015) and possibly Canador (Roney 1999) and Gomez Peak, all in the western Mimbres region, were probably built in response to persistent threats of raiding or attempts to drive populations from developed agricultural lands.

Not all thick midden sites are interpreted as farming settlements. LA 107539, located in the Mimbres River drainage, contained stratified components dating to this period with no indication of cultigens, structures, or storage pits (Brown 1998). Resinous substances found in a roasting pit and midden may have derived from processing agave or other succulents. In the absence of cultigens, the site was interpreted as a seasonal base camp related to wild resource procurement. Similarly, LA 159888 and LA 162023, both located in the Bootheel area, exhibit thick middens located adjacent to playa basins and fertile soils but have not yet produced maize or other cultigens.

Current interpretations suggest that these middens accumulated from repeated occupations that exploited the area's rich environmental zones.

ARCHITECTURE Residential architecture of this period is characterized by shallow circular or, less commonly, oval pits similar to contemporary structures identified elsewhere in the Southwest (Hemphill 1983; Lentz et al. 2013; Turnbow et al. 2000; Wills 1988a; Woosley and McIntyre 1996). Ranging up to 3.2 m in diameter, they varied from 6 to 12 m^2 in floor space and around 15 to 50 cm in depth. In some cases, small peripheral posts encircled the pits, and internal posts suggest roof support. Intramural hearths were either simple basin-shaped pits or informal surface facilities. Given their size, the structures could accommodate only a small nucleated family or household, and the relative absence of floor artifacts indicates that most domestic activities were performed outside or in other structures. According to pithouse attributes examined by Diehl (1997), these structures score rather low for architectural investment and residential commitment but were better constructed than the brush shelters found on more temporary camps.

Although poorly dated, purported Archaic structures at the Winn Canyon, Wind Mountain, and Ormand sites are slightly larger and deeper than most Early Agricultural structures, and Ormand Village has a confusing array of characteristics (i.e., deep vertical walls, clay or plaster floors, adobe-lined hearths, and, in one case, a short ramped entrance) more reminiscent of Early Pithouse dwellings. The structures at Winn Canyon and Wind Mountain had one radiocarbon date each that fell into the Early Agricultural temporal span. At Ormand, Hammack and his colleagues (1966) assumed that the eleven pit structures underlying a Salado village dated to the Archaic period given the lack of pottery on their floors (Wallace 1998). Of additional interest, surveys near the Ormand and Winn Canyon sites found eighteen other sites with one to twelve aceramic pithouse depressions ranging from 3 to 10 m in diameter (Chapman et al. 1985). If these structures are indeed Early Agricultural in age, then they probably fall late in the transition to the Early Pithouse period, perhaps around A.D. 100 to 150.

MORTUARY AND RITUAL BEHAVIOR Thus far, the earliest firmly dated human and animal burials in the Mimbres region occur within residential sites of this period (Duran and Manning 1993; Hemphill 1983; Kirkpatrick 2016; Turnbow et al. 2000). Although only eleven human burials have been confirmed, the construction of the graves, associated objects, and their placement within the settlements suggest mortuary and ritual behaviors related to family lineages, social memory, and a significance of place. All undisturbed burials were flexed, primary inhumations, except for one cremation from the Eaton site. Five were placed in recycled bell-shaped or cylindrical pits at

the Wood Canyon, Duke, and Forest Home sites. At Wood Canyon, a bell-shaped pit contained the articulated remains of a tightly flexed adult and disarticulated elements of two subadults mixed throughout the fill with sixty-two shell disk beads and a bone tube. All three may have been interred at the same time, but it is also plausible that the pit was reopened for each burial. This scenario implies group knowledge of the original burial location and a kin-based desire to place those remains together.

Three more elaborate, labor-intensive mortuary facilities may signify some degree of social status within the communities. The Wood Canyon settlements constructed two facilities on the outer edge of the occupations (Turnbow et al. 2000). In one case, an adult male was buried in a simple oval pit covered by large rocks and metates that conforms to the milling-stone-cairn mortuary complex from southern Arizona (Mabry 1998). As such, it currently represents the only burial of this kind confirmed in the Mimbres region. Two other individuals, a child and an adult male, were buried in small oval pits dug into the sides of the largest nonstructural pit on the site. A metate was positioned over each burial. The large pit was then backfilled with midden refuse containing a complete Cienega point, a quartz crystal, and abundant deer remains that could all represent graveside rituals. Equally elaborate was a primary cremation from the Eaton site associated with a flat-cobble grinding slab covered in red hematite, two vesicular basalt oval bowls, two projectile points, and a burned tubular bead (Hemphill 1983).

Besides human interments, the articulated remains of a red-tailed hawk were unearthed close to three complete San Pedro and Cienega points in a bell-shaped storage pit at Wood Canyon. Its purposeful burial may indicate totemism or animism among these populations.

FOOD PRODUCTION Evidence for intensified food production during this period is supported by the more frequent and widespread occurrence of maize, squash, and other potential cultigens and large storage pits (see tables 1.2, 1.3). Thus far, twenty direct AMS dates have been derived from maize, and other dates have come from maize-bearing aceramic deposits. Where more robust macrobotanical, pollen, and phytolith sampling occurred, maize has often been ubiquitous, commonly occurring in structures, hearths, and storage pits. Even with poor botanical preservation, maize was found in half of the eighteen sampled early Wood Canyon features but in all of the structures and bell-shaped pits. Around 450 years later, the Forest Home component had 95 percent ubiquity ($n = 20$ of 21 sampled features). Likewise, maize pollen occurred in 50 percent ($n = 8$) of the samples from early Wood Canyon and 100 percent of those from Forest Home ($n = 6$) and late Wood Canyon ($n = 3$). A tobacco seed and squash pollen and phytoliths were also identified at Forest Home. These results indicate that unlike the Arenal phase (700–200 B.C.), which was described as

distinctly nonagricultural, contemporary Early Agricultural populations in the Mimbres region likely had a greater reliance on farming.

Stable carbon isotope ratios in skeletal tissues provide another measure of maize consumption. Stable $^{12}C/^{13}C$ isotope analyses of human remains primarily from the Jornada region also included a burial recovered from Early Agricultural deposits at LA 75993 in the Mimbres region northeast of Deming (Duran and Manning 1993). The study concluded that this individual, buried in midden deposits dating between 560 and 175 B.C., was consuming maize in quantities similar to later El Paso phase pueblo populations further east. At the time, Duran and Manning (1993) questioned whether the skeletal remains were in fact associated with the dated deposits. However, in light of present evidence, these data lend support to the idea of greater maize dependency during the Early Agricultural period.

STORAGE FACILITIES Farming may have generated enough surplus food to account for the increased size and number of storage pits after 800 B.C. Large bell-shaped and cylindrical storage pits were identified at the early and late Wood Canyon components, Forest Home, Duke, SU, and Eaton and, although undated, in aceramic contexts at Mogollon village (Haury 1936) and the Ormand site (Wallace 1998). Most occurred in extramural contexts, although Forest Home, Eaton, and Ormand also revealed storage pits in the floors of pit structures.

Bell-shaped pits at the early Wood Canyon component were similar in size to those from Duke, Mogollon village, and Ormand; had a mean volume of 1364 L; and consistently contained maize remains. Huckell and colleagues (1995) developed a formula to estimate the storage capacity of bell-shaped pits based on Early Agricultural cob size. Using their assumptions, a pit of this size could hold 16,647 ears of maize.

Conclusions

In their study of the Mimbres Early Pithouse period, Diehl and LeBlanc (2001:4) noted that the "preceramic occupation of the Mimbres area is poorly documented and in fact so little evidence is available that a discussion of the preceramic occupations of the Mimbres Valley is not warranted." Considering those data gaps, we have synthesized the current knowledge of preceramic farming populations in the Mimbres region and concluded that those groups followed the same general pattern of Early Agricultural food production reported elsewhere in the American Southwest. For centuries following its introduction by 2000 B.C., maize farming probably had only a minor impact on Archaic hunter-gatherers who spent most of the year in small residentially mobile groups. Following 1300 B.C., more aggregated settlements and major

TABLE 1.3 Major Early Agricultural Midden and Residential Sites in the Mimbres Region

	2-Sigma ^{14}C	Midden	Maize	Structures	Large Storage Pits	Burials	References
Gila River Area							
Beargrass	A.D. 70–215	x	x	x			Turnbow et al. 2000
Wood Canyon (late)	A.D. 30–220	x	x	x	x	x	Turnbow et al. 2000
Ormand	no date	x		x	x		Hammack et al. 1966; Wallace 1998
WS 17	95 B.C.–A.D.135	x		x			Peck 1991
Duncan Donut	360–60 B.C.	x	x	x			Roney et al. 2012
Forest Home	390–210 B.C.	x	x	x	x	x	Turnbow et al. 2000
Round Mountain	510–395 B.C.			x			Roney et al. 2012
Eaton	540–205 B.C.	x		x	x	x	Hemphill 1983
Wind Mountain	730 B.C.–A.D. 130			x			Woosley and McIntire 1996
SU	760–90 B.C.	x	x	x	x		Wills 1989
Winn Canyon	805 B.C.–A.D. 65	x		x			Fitting 1973
Wood Canyon (early)	805–770 B.C.	x	x	x	x	x	Turnbow et al. 2000
Mimbres River Drainage							
LA 107539	20 B.C.–A.D. 400	x					Brown 1998
Harris	360–115 B.C.		x				Roth 2015
Duke	540–230 B.C.	x	x		x	x	Kirkpatrick 2016
LA 159879	770–535 B.C.	x	x	x			Lentz et al. 2013
LA 159879	835–795 B.C.	x		x			Lentz et al. 2013
Duke	895–550 B.C.	x			x	x	Kirkpatrick 2016
LA 159879	975–840 B.C.	x		x			Lentz et al. 2013
LA 107539	830–545 B.C.	x					Brown et al. 1998
Black Range							
LA 53488	770–210 B.C.	x	x				Kugler 1994
Victorio Arroyo	740–440 B.C.	x	x				Laumbach 2015
LA 75993	750–175 B.C.	x				x	Duran and Manning 1993
LA 53488	1385–900 B.C.	x					Kugler 1994
Chihuahua							
Cerro Vidal	345–210 B.C.	x	x	x			Hard et al. 2001
Cerro Juanaqueña	360–180 B.C.	x	x	x			Hard et al. 2001
Cerro Juanaqueña	1280–1130 B.C.	x	x	x			Hard et al. 2001
Cerro Juanaqueña	1605–1415 B.C.	x	x	x			Hard et al. 2001
New Mexico Bootheel							
LA 159888	A.D. 1–130	x					Kurota and Cohen 2009
LA 159888	350–50 B.C.	x					Kurota and Cohen 2009
LA 162023	520–390 B.C.	x					Roney et al. 2015
LA 162023	920–810 B.C.	x					Roney et al. 2015

shifts in social organization are evidenced by the construction of sophisticated irrigation and field systems along the major watercourses of the southern basin and range country, as well as the appearance of cerros de trincheras sites along the periphery of the Mimbres in northwestern Chihuahua and the Tucson Basin. We think that these changes reflect the first subsistence economies that were dependent upon agriculture. However, in the Mimbres core area we have yet no strong evidence of similar shifts until after 1000 B.C. and probably not until about 800 B.C., when a tipping point occurred to more intensified farming.

With the onset of this intensified agriculture, farming settlements expanded across much of the Mimbres region, situated along well-watered drainages suitable for farming in both upland and desert lowland settings. Increased food production and storage capacities at these sites suggest farming was contributing a more significant portion of the diet. Where sufficient data exist, we see that maize ubiquity was between 50 and 95 percent, comparable to the figures recorded for many Early Pithouse sites. It is beyond this study to evaluate the differing opinions regarding Early Agricultural or, for that matter, Early Pithouse dependence on food production, but the settlements do argue for fundamental changes in land use related to increased reliance on farming.

While residential mobility likely decreased with intensified farming, the longevity of any settlement was probably not more than a few years. Structures showed little, if any, remodeling or subsequent refuse disposal by Early Agricultural inhabitants, but the settlements survived long enough to produce dense middens, discreet ash dumps, multiple burials, ground-stone caches, numerous roasting and other cooking pits, and structures. Questions remain as to whether these farming sites were occupied sporadically in a seasonal settlement cycle or whether populations were seasonally sedentary over multiple seasons or, following Mabry's (1998) definition, sedentary over the entire year with some portion of the population leaving for logistical procurement sites. Clearly, farming requires people to be present in the spring to prepare and plant fields, in summer to reduce animal predation, and in fall to harvest, consume, and store surpluses. Wild plant foods from these settlements also suggest spring to fall occupations. Although not as deep, large, or as thermally insulated as later pit structures, Early Agricultural dwellings in the farming settlements were better constructed than those brush shelters typical of temporary camps, and the presence of interior fire hearths could make them comfortable for cooler weather habitation. Hunter-Anderson (1986), Whalen (1994), and Huckell et al. (2002) have proposed that large-scale, on-site storage could support an overwintering strategy with groups leaving in the spring after the stores had been consumed. On the other hand, ethnographic data from the Eastern Woodlands and Great Plains indicate that subterranean storage pits were built primarily to conceal food surpluses from pillagers, particularly

during periods of village abandonment in the winter (DeBoer 1988). If that were the case, then Early Agricultural populations would have hidden their crops before leaving for winter hunts, returning in the lean spring season to subsist on their food stocks while preparing fields for planting.

Finally, people living in the Mimbres region seem to have continued a basically Early Agricultural period lifeway for another two hundred years after functional storage and cooking ceramics were introduced around A.D. 175. Diehl and LeBlanc (2001) noted this pattern for the Mimbres region as did Gilman (1995) for the San Simon branch to the west and Wills (1995) for the Reserve area to the northwest, so it may represent a region-wide pattern.

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