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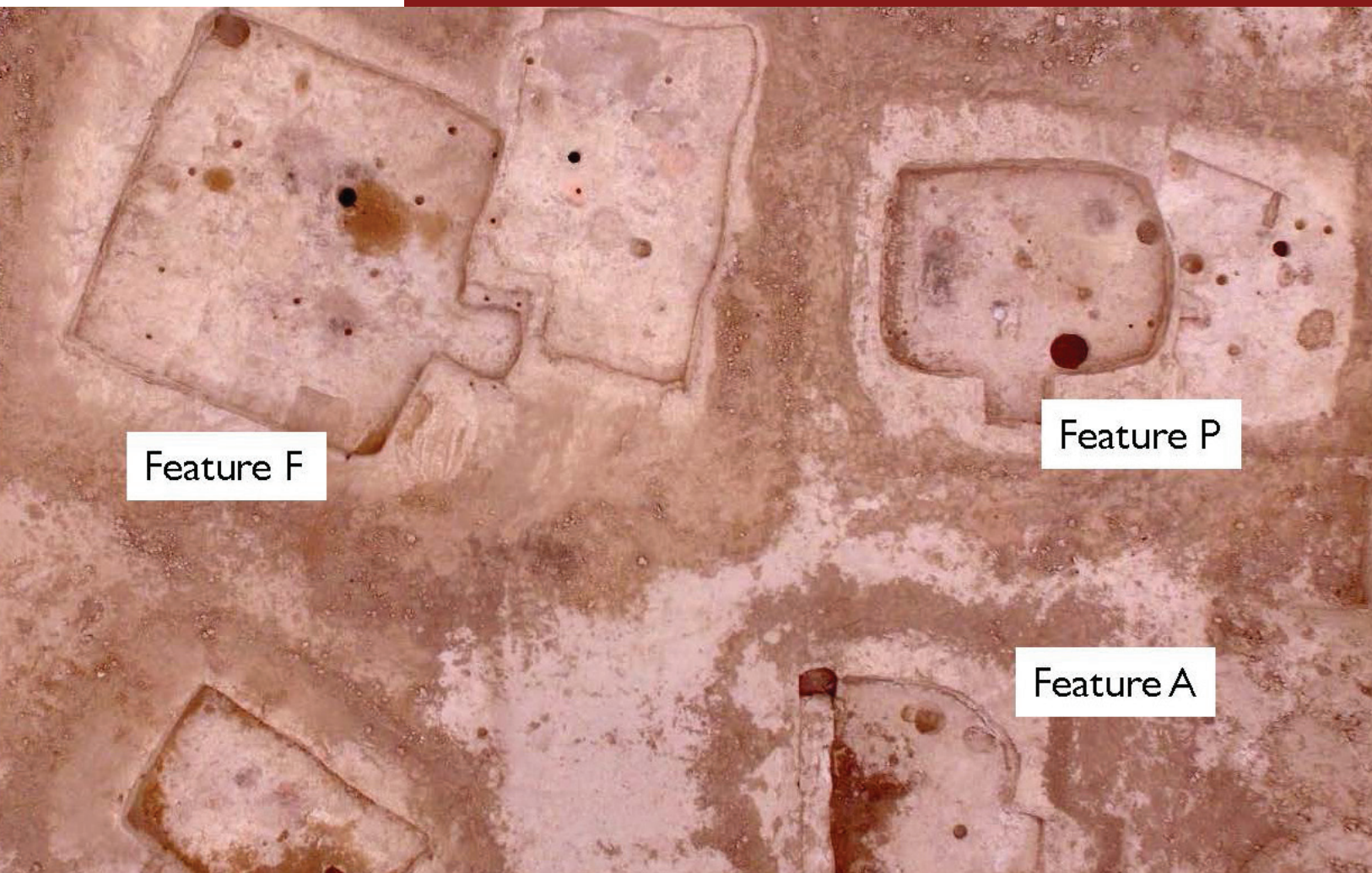

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VARIABILITY IN CAVATE FEATURES AT OLD CAVES PUEBLO (AD 1250–1330), FLAGSTAFF, ARIZONA

Dennis Gilpin

Old Caves Pueblo (AD 1250–1330) is perhaps the latest pueblo in the Flagstaff vicinity, and it rivals nearby New Caves Pueblo (AD 1250–1300) as the largest. Located on the southern side of the rim of Old Caves Crater a few kilometers north of Flagstaff, it has 1 walled plaza, 4 room blocks (each containing from 2 to 30 rooms for a total of at least 47 rooms), 9 bedrock floors or dugouts, 14 cellars, and 37 cavate dwellings. Professional archaeologists from the Smithsonian Institution Bureau of American Ethnology began investigating Old Caves Pueblo in the 1880s, and the site received further attention from the Milwaukee Public Museum and the Museum of Northern Arizona. Looting of the site also began in the 1880s. Examination of the pueblo from 2019 to 2021 revealed that the cavate features at the site are more variable and complex than previously reported. Analysis of variability in the cavate features at Old Caves Pueblo provides a better understanding of the site, its history, its role in the settlement system of the Flagstaff area, and the conditions that led to the depopulation of the Flagstaff area after AD 1300.

From about AD 1100 to 1300, peoples of the Sinagua region of north-central Arizona settled into aggregated villages as large as several hundred rooms. Pilles's (1996: Figures 5.1 and 5.2) maps of the geographic distribution of late Sinagua sites depict four major site clusters: Wupatki, Flagstaff, Anderson Mesa, and Verde Valley. Within these clusters is a stratified settlement pattern of central pueblos, smaller pueblos, and field houses. Central pueblos, which form the nuclei of communities, are regularly spaced and in close proximity to each other (Wilcox [2011:67] says 5–7 km apart), but many sites in the settlement system also have defensive postures, with villages, refuges, forts, and lookouts often positioned on the rims of craters, hilltops, high spots, pinnacles, and promontories above canyon confluences (see Whittaker and Kamp 2012). The late Sinagua settlement system thus described is similar to the Tsegi phase (AD 1250–1300) settlement system of the Tsegi canyons, Klethla Valley, Long House Valley, and Kayenta Valley described by Dean (1996) and Haas and Creamer (1993, 1996), who view the central pueblos and their surrounding smaller sites as individual communities, which in turn were close enough to each other to have intercommunity visibility and communication. Dean (1996:27) discerns "no apparent dominance-subservient relationships" among communities within the multi-community "interactional systems," but in the Tsegi phase systems, as in the Sinagua systems, proximity of communities suggests interaction and cooperation while the defensive positioning of the central pueblos suggests competition and conflict.

Understanding the settlement system entails both large-scale geographical analysis, such as conducted by Dean (1996), Haas and Creamer (1993, 1996), Pilles (1996), and others, as well as more detailed documentation of specific sites. Obviously, the individual site documentation forms the basis for developing and testing settlement models. In many cases, only old documentation exists. One such case is Old Caves Pueblo, which I have been documenting since 2019.

Old Caves Pueblo (AD 1250–1330) is perhaps the latest pueblo in the Flagstaff vicinity (i.e., modern Flagstaff and its suburbs), and it is one of largest pueblos in the area, rivaling New Caves Pueblo (AD 1250–1300), which is approximately 7.5 km to the east-southeast of Old Caves Pueblo. Located on the southern side of the rim of Old Caves Crater (Figure 1), Old Caves Pueblo overlooks

Figure 1. Photograph of Old Caves Pueblo. The site is the bare spot below the summit of the crater.

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Doney Park, and it contains an estimated 50–90 rooms and at least 50 cavate chambers.

Old Caves Pueblo attracted the interest of some of the earliest (late nineteenth and early twentieth century) archaeologists to work in the Southwest: James Stevenson, John Wesley Powell, the Mindeleff brothers, and Jesse Walter Fewkes, all from the Smithsonian Institution. It later received attention from the Milwaukee Public Museum and, of course, Harold S. Colton at the Museum of Northern Arizona (MNA). It also attracted looters from the 1880s through the 1930s and later. In 1932 Colton (1932:23) proposed protecting Old Cave Pueblo as a national monument, but by 1946 thought that the looters had destroyed the site (Colton 1946:38).

My more detailed recording of the site from 2019 to 2021 has revealed that the cavate features at the site (which constitute most of the visible architectural data) are more variable than Fewkes and Colton described. Analysis of variability in the cavate features at Old Caves Pueblo in the context of the overall site architecture provides a better understanding of the organization of the site, its history, its role in the settlement system of the Flagstaff area, and the conditions that led to the depopulation of the Flagstaff area after AD 1300.

PREVIOUS RESEARCH

History of Research

Scientific investigation of Old Caves Pueblo began in the 1880s, when John Wesley Powell, Director of the Smithsonian Institution Bureau of American Ethnology (BAE), sent James Stevenson, the brothers Victor and Cosmos Mindeleff, and Jesse Walter Fewkes to the site and visited it himself with Stevenson in 1885. Powell published two brief accounts of Stevenson's work and his own work with Stevenson in his director's annual reports (Powell 1887, 1891).

James Stevenson visited Old Caves Pueblo (although he did not name it as such) in 1883, finding that it "consisted of sixty or more cave dwellings, situated on the summit of a round lava-capped hill. The dwellings are close together and were carved out beneath the hard shelter rock of lava, under which the material was rather loose, readily yielding to the rude stone implements used in making the excavations" (Powell 1887:xxiii). Stevenson collected pottery and reported seeing "metates, stone axes, mullers, and corn cobs," as well as bones of "elk, deer, wolf, badger, rabbit, and some other animals" (Powell 1887:xxiii).

In 1885 Stevenson and Powell both visited Old Caves Pueblo. Powell described Old Caves Pueblo as consisting of an estimated 150 pit chambers excavated into the "indurated and coherent cinder mass" (Powell 1891:xix). "The chambers are of irregular shape, and occasionally a larger central chamber forms a kind of vestibule to several smaller ones gathered about it. The smaller chambers are sometimes at the same altitude as the central or principal one, and sometimes at a lower altitude" (Powell 1891:xix). "At the very summit of the little cone there is a plaza, inclosed [sic] by a rude wall made of volcanic cinders, the floor of which was carefully leveled. The plaza is about forty-five by seventy-five feet in area" (Powell 1891:xix–xx).

In a June 11, 1885, research proposal to Powell, Victor Mindeleff proposed spending "a week or ten days" later that summer at "the excavated lodges near the San Francisco Mnt's [sic], securing photos, plans, and cross-sections of the hills illustrating the underground arrangement of the excavated cells" (Mindeleff 1885). Victor Mindeleff was an architect sent to the Southwest by Powell to map pueblos and pueblo sites. His brother Cosmos was a fieldworker who conducted surveys of the archaeology of Canyon de Chelly and the Verde Valley and did stabilization at Casa Grande. The brothers spent some time at Old Caves Pueblo in 1887 (Powell 1892). Neither Victor nor Cosmos ever produced a report, however, although Cosmos mentioned the cavate dwellings of the San Francisco Peaks in his Verde report (Mindeleff 1896), relying on Powell's published descriptions rather than his own research. Both brothers were keen observers and made great maps, so it is unfortunate not to have their insights on Old Caves Pueblo.

Jesse Walter Fewkes investigated Old Caves Pueblo in 1896 as part of an expedition that also examined the Homol'ovi sites near Winslow, the Chavez Pass sites on Anderson Mesa southeast of Flagstaff, New Caves Pueblo (approximately 7.5 km east-southeast of Old Caves Pueblo), Cosnino Caves (which Fewkes called Turkey Tank Caves, 11 km east-southeast of Old Caves), and Wupatki. Fewkes described Old Caves Pueblo in an American Anthropologist article (Fewkes 1900) and a BAE Annual Report (Fewkes 1904). Fewkes (1904:36) said that the information on Old Caves Pueblo in the BAE report is verbatim from the American Anthropologist article. Fewkes (1904:36–37, Figure 3, Plate 1) described Old Caves Pueblo as a masonry pueblo covering about 5 acres, with surface rooms probably 1 story high, most of which had elaborate subterranean rooms or basements carved into the soft, cinder conglomerate or volcanic breccia beneath the floors of the masonry rooms. "On the top of this height there is a level space which was surrounded by a rough wall made of volcanic breccia" (Fewkes 1904:36). Within the main room block, Fewkes (1904:36) observed "level spaces which seem to have been plazas." The basement walls retained bits of plaster, and Fewkes thought that "the floor, walls, passageways,

and possibly the roof, were smoothly finished" (Fewkes 1904:37). Fewkes (1904: Plate 1) illustrated a standing wall. Fewkes excavated one suite of two cavate chambers (Figures 2 and 3). Each chamber had a vertical roof entryway. Chamber C was a small area that could be accessed from each of the main chambers. Chambers D, E, and F were small recesses, and Chambers D and F had flues or ventilators to bring air into the dwelling. Fewkes (1904) did not discuss or illustrate any artifacts from Old Caves Pueblo.

In 1922, Samuel Barrett, director of the Milwaukee Public Museum, investigated the site (which he called "Cave Hill"), and excavated a suite of two cavate chambers (Figures 4 and 5), one of which had a firepit and one of which had what Barrett (1922:180) called a "chimney" (probably a vent or skylight). Barrett (1922:179) also reported that most cavate chambers had smoke-blackened ceilings. A few weeks prior to Barrett's investigations, his friend Mr. Ivens visited the site and recovered three small pottery vessels and a yucca sandal fragment from the site. Barrett observed black-on-white pottery, red and white pottery, black ware, yellow ware, and "a ware decorated with imitation coil and thumb nail designs" (Barrett 1922:176). Barrett (1922:177, 180) also said that mullers and metates were common.

Harold S. Colton and Mary-Russell Ferrell Colton founded MNA in 1928 to foster a deeper understanding of the region and to keep collections from the area closer to their original home. Harold Colton wrote extensively about the archaeology of the Flagstaff area, and he described Old Caves Pueblo in two of them, one in 1932 and the other in 1946. He made a map of the site (Figure 6) and collected a sample of pottery from it, which allowed him to date the site to about AD 1250–1300. He noted the absence of Flagstaff Black-on-white, the dominance of Wupatki Black-on-white, and the presence of Jeddito Black-on-yellow. Current dating of Jeddito Black-on-yellow, estimating that the pottery type began about AD 1325, would indicate that Old Caves Pueblo might have been occupied as late as AD 1325 or somewhat later. Colton estimated that the site had 70–80 ground-floor rooms, two-thirds of which had subterranean storage rooms beneath them.

Since the BAE's late nineteenth-century work, cavate sites have been recognized as a type of architecture characteristic of the Flagstaff area and the Verde Valley. Pilles (1996: Table 5.2) summarized the distribution of Pueblo III (AD 1150–1350) site types in the Wupatki, Flagstaff, Anderson Mesa, and Verde Valley areas and found cavate sites only in the Verde Valley, where 44 (11.4%) of 386 components were cavate sites, and in the Flagstaff area, where 26 (3.5%) of 739 components were cavate sites.

All the early researchers at Old Caves Pueblo (Stevenson, Powell, the Mindeleff brothers, Fewkes, Barrett, and Colton) recognized that the underground chambers at the site were intentionally excavated features (cavate chambers as opposed to natural caves)

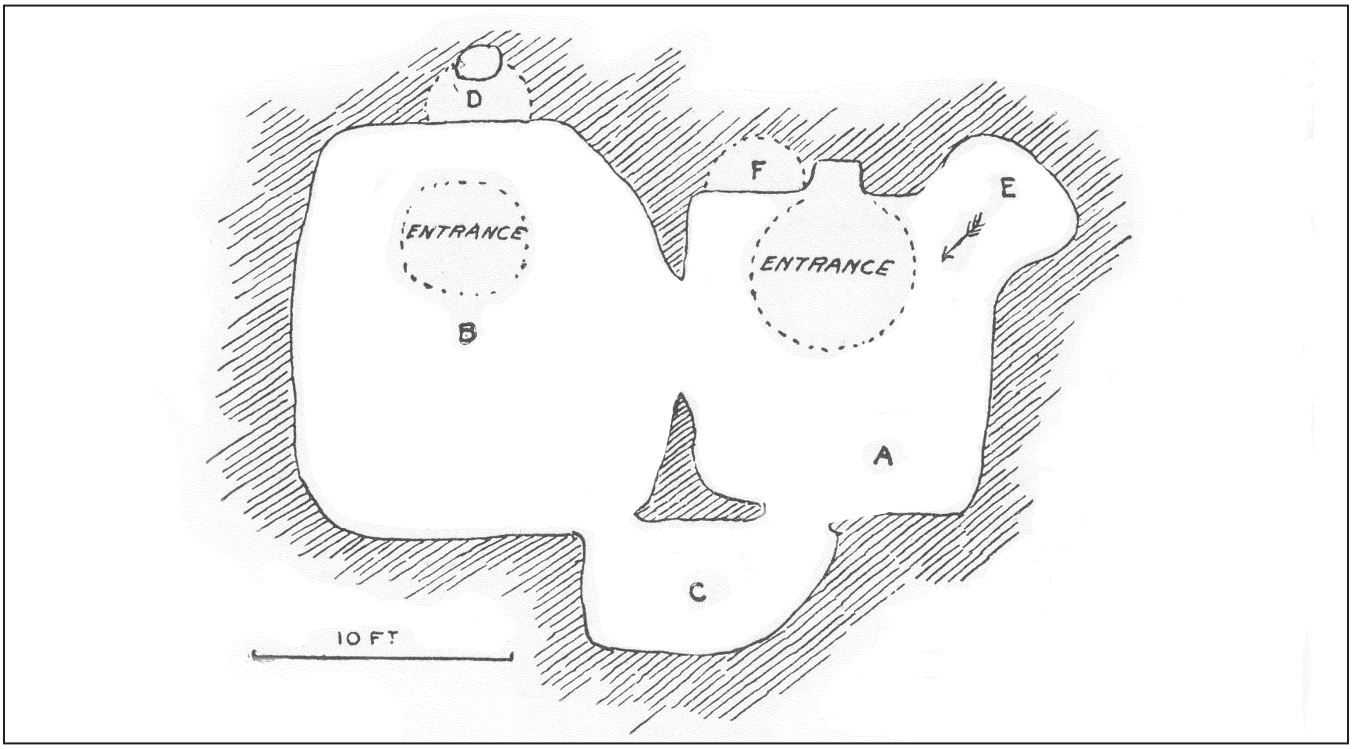

Figure 2. Fewkes's plan of the suite he excavated (Fewkes 1904: Figure 3).

Figure 3. Photograph of Fewkes's suite from the east chamber to the west chamber.

Figure 5. Photograph of the interior of the three-room suite excavated by Samuel Barrett of the Milwaukee Public Museum, taken from the northwest chamber through the central chamber to the southeast chamber.

Figure 4. Photograph of the exterior of the three-room suite excavated by Samuel Barrett of the Milwaukee Public Museum, depicting the two entryways with the vent or skylight between them, view to northwest.

and were intrigued by the significance of this manner of building. During his 1853 survey of a railroad route across northern Arizona, Amiel Weeks Whipple noted the presence of cavate architecture in the Flagstaff area at the site of Cosnino Caves, also called Turkey Tank Caves, approximately 11 km east-southeast of Old Caves Pueblo (Whipple 1856:81–82).

During his 1891 archaeological survey of the Verde Valley, Cosmos Mindeleff (1896) recorded large numbers of cavate sites, including the site now known as the Mindeleff Cavate Site near Camp Verde. Mindeleff (1896:217, 222–225) noted that cavate architecture had been reported along the San Juan River, near the San Francisco Mountains, along the Verde River, and in the Rio Grande Valley of New Mexico. Both Mindeleff (1891:220) and Fewkes (1904:36) recognized that the cavate dwellings and the pueblos of the Verde Valley and the San Francisco Peaks were contemporaneous, and the people of the two regions were just taking advantage of similar, localized, geological conditions that allowed the excavation of cavate features into soft bedrock. Mindeleff (1896:260–261) thought that the Verde Valley cavate sites were seasonally occupied farming overlooks (which was also his interpretation of the cliff dwellings of Canyon de Chelly).

In discussing cavate dwellings in the Verde Valley, Fewkes (1898) proposed that the cavate dwellings were constructed by the same people who built the pueblos. In the Flagstaff area, Fewkes (1904:35) made a distinction between cavate lodges with vertical entrances (as at Old Caves Pueblo) versus lateral entrances (as at New Caves Pueblo and Turkey Tank Caves) but believed that both types of lodges were built by people of a single culture. He also thought that the cavate dwellings were contemporaneous with the pueblos and that they had the same function as the pueblos (permanent habitations); pueblo residents and cavate residents were just making use of the available building material. Fewkes

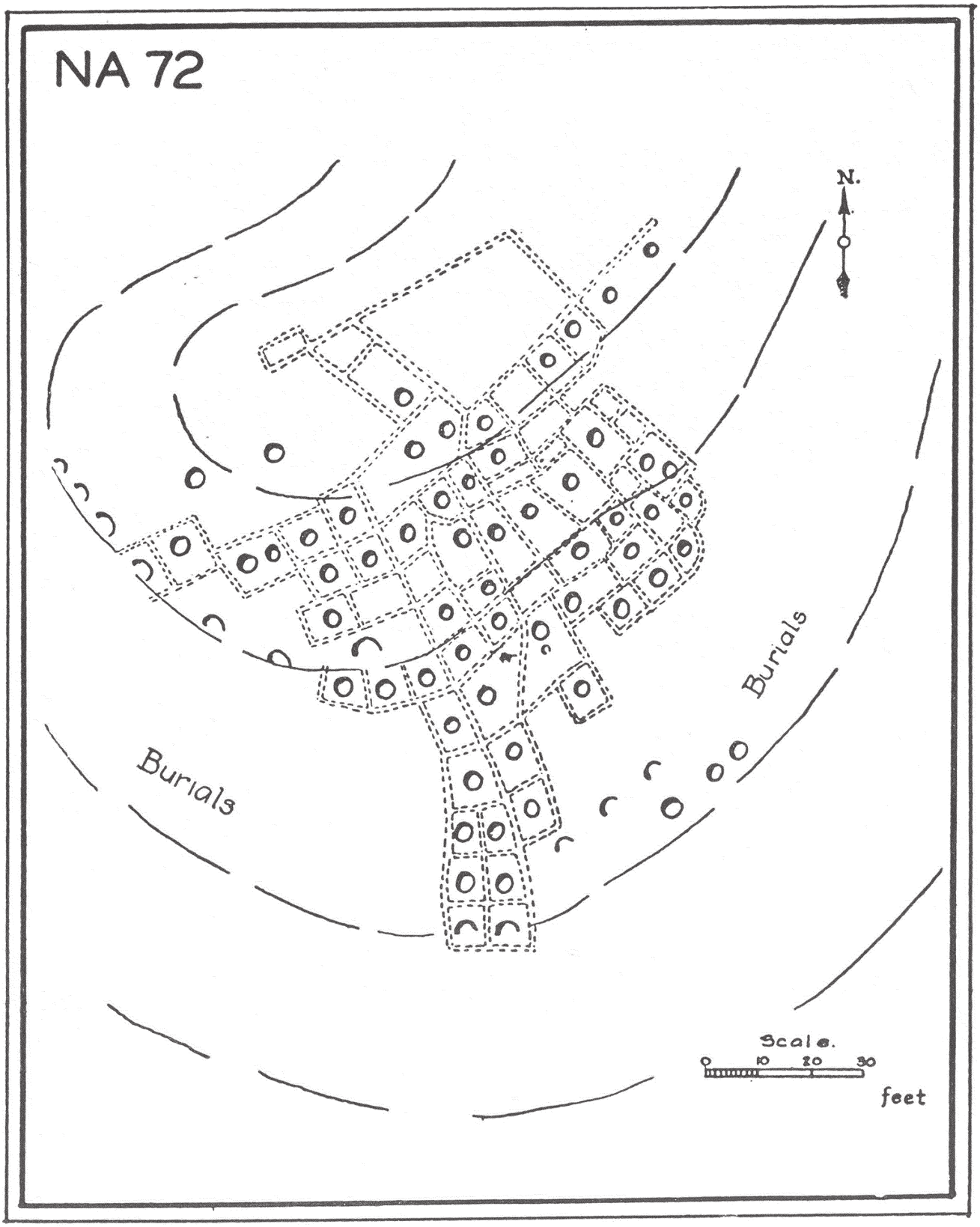

Figure 6. Colton's map of Old Caves Pueblo (Colton 1946: Figure 17).

did recognize that the cavate dwellings had defensive attributes and lookout attributes.

In the Flagstaff area, two cavate sites (Turkey Tank Caves or Cosnino Caves, and New Caves Pueblo) have received extensive attention, and one cavate site (Clarke's Caves) has been minimally described.

Turkey Tank Caves (NA117), also called Cosnino Caves by Whipple, consisted of 21 cavate dwellings (Colton 1946:41–43, Figure 20). Fewkes (1900, 1904) and MNA (Colton 1946) conducted investigations at the site. The chambers were mostly circular. Five had no storage bins, eight had one storage bin, seven had two storage bins, and one had five storage bins. In only one case were chambers connected to form a suite (of three chambers). Three chambers had masonry antechambers in front. Colton (1946:43) dated the site to the Elden phase, AD 1125–1200, and attributed later pottery types at the site to the presence of permanent water in the Turkey Tanks, which attracted travelers throughout history. The site has produced only two tree-ring dates, the latest of which, AD 1276, is a noncutting date (Robinson and Cameron 1991:5).

New Caves Pueblo (NA486) is on the rim of O'Neill Crater. Fewkes (1900, 1904) and MNA (Colton 1946) conducted investigations at the site, but the most extensive and recent work at the site has been done by Kamp and Whittaker (2009; see also Whittaker and Kamp 2012). Dating to AD 1250–1300, the pueblo consists of a walled plaza and adjacent community room, 47 masonry dwelling rooms, 43 cavate chambers, and 25 pithouses (Whittaker and Kamp 2012:149). Halfway up the western slope of the cinder cone is Bench Pueblo with 20 rooms and pithouses (Whittaker and Kamp 2012:149). A massive wall 215 m long runs along the northwestern rim of the crater, protecting the portion of the site just inside the crater rim (Colton 1946: Figure 34). The cavate chambers at New Caves Pueblo were excavated into less consolidated cinders than the cavate chambers at Old Caves Pueblo, necessitating the construction of retaining walls (Colton 1946:67).

Clarke's Caves (NA811), 1.6 km northwest of Turkey Tank Caves, consists of five main chambers and one slight overhang with a masonry wall in front (Colton 1946:78–79, Figure 43). The cavate chambers form two two-room suites and one single-chamber dwelling with a masonry wall in front and a storage bin in back. Colton (1946:79) dated the site to about AD 1125–1200.

In 1992 Susan Hall (1992) wrote her Northern Arizona University Master's thesis on the Mindeleff Cavate Site, based heavily on Cosmos Mindeleff's description. Hall estimated that the site consisted of more than 350 rooms connected into approximately 100 suites of rooms. Because some rooms were inaccessible, Hall investigated 343 rooms in 89 suites. Hall re-recorded the five suites Mindeleff recorded in detail and recorded five additional suites in detail. She made plans of all 89 suites. The typical room suite consisted of three to five rooms. One of the rooms in each suite was usually larger than the others and had a doorway opening to the outside. The large rooms were rectangular with rounded corners and high, smoke-blackened ceilings. The smallest habitation room covered only 5 m^2, but habitation rooms on average covered 15 m^2. Ledges, niches, and small holes were carved into the walls, which, like the ceilings, were smoke-blackened. Mindeleff reported that the floors of the large rooms were plastered and contained pits and plaster ridges, although these were mostly gone at the time of Hall's research. (But Hall found some pits that were not reported by Mindeleff.) Behind the large rooms were smaller rooms, some of which were smoke-blackened, while others were not. A few suites had what Hall called "alcove rooms" opposite the doorways, which had floors higher than the floor of the main room. Some alcove rooms had niches. The smallest "suite" was actually a single room, 5 m^2. The smallest multi-room suite consisted of a large room and a small room, total 9.4 m^2. The average area of a room suite was 24 m^2. The largest 10-room suite had a floor area of 71 m^2. At 10 m^2 per person, average household size would be 2.4 people, which seems small (we normally think of a household as a nuclear family of four or five). A few large suites consisted of six to ten rooms and may have sheltered extended-family households. These large suites of rooms typically contained two large rooms. Using Hall's calculation of 100 suites, 24 m^2 per suite, total population of the site would be about 240 people.

Looting

Even as archaeologists were investigating Old Caves Pueblo, looters and pothunters were at work there. One of the earliest accounts of looting at Old Caves Pueblo comes from a man named "Dad" Power (*Coconino Sun* 1919). A 1919 article in the *Coconino Sun* (forerunner of the *Arizona Daily Sun*) published Power's description of looting at Old Caves Pueblo shortly after he arrived in Flagstaff in 1888: "The old cave dwellings were in good shape. . . . [At] The caves one could pick up lots of curiosities. I sent a whole boxful of handsome trinkets to Michigan" (*Coconino Sun* 1919:3).

Harold Colton told Platt Cline that "Ben Doney [after whom Doney Park is named] was an inveterate pothunter and by 1900 had amassed a huge collection of prehistoric materials" (Cline 1976:149). Although Colton did not mention Old Caves Pueblo specifically in this quote, it seems likely that Doney must have dug at Old Caves Pueblo.

As mentioned above, the 1922 Milwaukee Public Museum investigations of Old Caves Pueblo were prompted by pothunting. Samuel Barrett of the Milwaukee Public Museum was taken to Old Caves Pueblo by a friend of his, Mr. Ivens of Milwaukee, who had preceded him to Flagstaff and collected three pots and a sandal from the site.

Harold S. Colton expressed alarm about the looting of Old Caves Pueblo in 1932. He wrote: "Since this pueblo is unique in pueblo architecture, it should be preserved from the pot hunters [sic], who are mining in its burial grounds. The hilltop should be a National Monument" (Colton 1932:23). One of the pothunters Colton warned about was Joe Babbitt, the son of one of the five Babbitt brothers who moved to Flagstaff in the nineteenth century. From about 1932 to 1955, Babbitt dug extensively in many sites east of Flagstaff, including Old Caves Pueblo, and he kept brief notes on his excavations (Goetze and Mills 1991:77). His collection was donated to MNA in 1981 (Goetze and Mills 1991:77), and portions of it are on exhibit. Lloyd Bolles was an employee of Babbitt's and sometimes dug with Babbitt. His collection was acquired by Gilcrease Museum in Tulsa. By 1946, Colton seemed to believe that the site was so disturbed that it no longer warranted protection, writing, "Pot hunters [sic] have subsequently wrecked the site and excavated an extensive burial ground" (Colton 1946:38).

Colton's 1946 assessment of Old Caves Pueblo largely ended serious archaeological investigations of the site, and his 1932 and 1946 descriptions of the site remained the primary sources for interpreting the site and its role in Flagstaff prehistory (Bernardini and Brown 2004; Pilles 1996; Whittaker and Kamp 2012). Despite Colton's assessment of Old Caves Pueblo, the site has become a popular hiking destination in recent decades (Hendricks 2019; Mangum and Mangum 1992; McManis 2019). Popular accounts of the site present incorrect statements that the cavate features were natural caves, lava tubes, volcanic gas bubbles, and so forth (misinterpretations that provoked Flagstaff volcanologist Richard Holm to write a letter of protest to the *Arizona Daily Sun* [Holm 2019]).

CURRENT RESEARCH

My current research on Old Caves Pueblo was prompted by the popular misinterpretations mentioned above and the realization that even scientific interpretations of Old Caves Pueblo and its role in the late Sinagua settlement system were based primarily on Colton's descriptions from the 1930s and 1940s (Colton 1932, 1946). As an example of the inadequacy of the existing documentation, Colton's (1932, 1946) plan map depicts cavate entrances as circles but does not depict the plans of the cavate features beyond the entrances (in contrast to Mindeleff's plan of the Mindeleff Cavate Site in the Verde Valley or Colton's plan of Turkey Tank Caves in the Flagstaff area).

Secondarily, as discussed above, all the early researchers (Stevenson, Powell, the Mindeleff brothers, Fewkes, Barrett, and Colton) emphasized the significance of the site because of its cavate architecture, but the cavate architecture at Old Caves Pueblo has not been adequately documented. As mentioned above, Susan Hall restudied the Mindeleff Cavate Site in the Verde Valley for her thesis (Hall 1992), but existing documentation of Old Caves Pueblo was not sufficient to understand the cavate features at Old Caves Pueblo.

Methods

I made 14 trips to Old Caves Pueblo from September of 2019 to early 2021, focusing on mapping the site and recording more detailed information on the cavate features. I mapped the site with a hand-held GPS unit (Figure 7) supplemented by aerial imagery from January 7, 2021, when Bob Mark and Evelyn Billo of Rupestrian CyberServices accompanied me to Old Caves Pueblo to photograph the site using their drone. I photographed and recorded information on cavate features: UTM coordinates, type of feature (stand-alone cavate dwellings, bedrock floors or dugouts, and cellars), entrances (vertical or side), floorplan, walls, and internal features. I made notes on the range of artifacts visible on the surface, but I have not conducted a systematic recording of surface artifacts.

SITE DESCRIPTION

As it appears today, Old Caves Pueblo covers an area approximately 100 m in diameter or 0.8 ha. It has 1 walled plaza, 4 room blocks (each containing from 2 to 30 rooms for a total of at least 47 rooms), 9 bedrock floors or dugouts, 14 cellars, and 37 cavate dwellings. The architecture can be discussed in terms of the pueblo and the bedrock features.

Pueblo

The pueblo consists of a walled plaza and four room blocks containing at least 47 rooms (Table 1). (Colton's map depicts 62 rooms in an arrangement similar to the plan I have mapped, although in Colton's plan, the rooms are smaller than what I have observed. It is unclear to me whether 62 rooms were visible during Colton's in the early twentieth century and subsequent looting at the site has obliterated some room outlines, or whether Colton projected more numerous, smaller rooms. Excavation would be needed to resolve this discrepancy.)

Table 1. Area and Number of Rooms in Room Blocks

Room Block	Room Block Area (m^2)	Rooms	Average Room Area (m^2)
Summit	54	2	27
Western	160	8	20
Main	773	30	26
Southern	118	7	17
Total	1105	47	23.5

The plaza is on the crest of the crater rim. It covers an area measuring about 20 m northeast-southwest by 15 m northwest-southeast (300 m^2). The northeastern, southeastern, and northwestern walls are massive, double-simple masonry (two blocks wide with blocks placed side-by-side [Lekson 1984: Figure 2.5]). Northeast of the plaza is a smaller walled space measuring 8 m northeast-southwest by 15 m northwest-southeast. The southwestern side of the plaza is bounded by the summit room block.

The summit room block, at the southwestern end of the plaza, is a two-room building covering an area measuring 6 m northeast-southwest by 9 m northwest-southeast. Although the rooms have been dug into, the rubble mound remains over 1 m high.

The western room block, to the southwest of the summit room block, is an eight-room building covering an area measuring 15 m northeast-southwest by 11 m northwest-southeast. Rooms are arrayed in two rows of three rooms and one row of two rooms. Two rooms have cellars. Although all the rooms appear to have been dug into, the two eastern rooms are currently filled with rubble, the bedrock floor of the north-central room is exposed, the south-central room is largely emptied, the northeastern room is largely emptied, and the southwestern room is filled with rubble. Several distinct wall alignments are visible.

The main room block covers a 30 by 30 m area and contains about 30 rooms arrayed in five to six rows with about five rooms in each row. Although all the rooms appear to have been dug into, all are mostly filled with rubble. Cellars are evident in four of the rooms. The northern row of rooms is today evident as two deep depressions. Curving walls and irregular room sizes and shapes are suggestive of accretional and relatively unplanned growth of the main or central room block.

The southern room block is a six-room building covering an area measuring 4–8 m wide (east-west) by 17 m long (north-south). Rooms are arrayed in a single row, one room wide. Colton's map depicts cellars in each of these rooms, but no cellars are visible currently, despite the room block having been almost entirely cleared of rubble.

The pueblo walls are constructed almost entirely of basalt blocks arranged in double-simple masonry. Blocks and spalls of limestone and sandstone are present in the rubble but use of limestone and sandstone in walls is not visible.

Bedrock Features

Old Caves Crater is a cinder cone composed of loose cinders, as well as more consolidated volcanic deposits of hard but crumbly rock which forms cliffs and outcrops. Powell (1891:xix) called the hard, crumbly deposits an "indurated and coherent cinder mass." Fewkes (1904:36) described the deposits as "a conglomerate of cinders or volcanic breccia." Colton (1946:67) said the cavate lodges at Old Caves Pueblo were excavated into "half-consolidated scoria." Flagstaff volcanologist Richard Holm (2019:A-10) described the consolidated rock as "a deposit of large volcanic particles (volcanic bombs)." The occupants of Old Caves Pueblo excavated into the cliffs and outcrops of the hard but crumbly deposits to construct dwellings, floors or dugouts, cellars, and other features.

I have recorded 63 features excavated into bedrock, including 37 cavate dwellings, 8 floors or dugouts, 16 cellars, and 2 features of indeterminate morphology and function (Table 2). I recorded plan, entryway, estimated area, and subfeatures where possible. I was able to record all these variables for 41 bedrock features. In 19 cases, only the entryway was visible, and the rest of the feature was filled with rocks, and in three cases, the entryway was too small and difficult of access to see inside.

Table 2. Distribution of Bedrock Features

	Full Data	Filled	Indeterminate	Total
Dwellings	27	10		37
Floors / Dugouts	9			9
Cellars	8	6		14
Unknown		1	1	2
Total	44	17	1	62

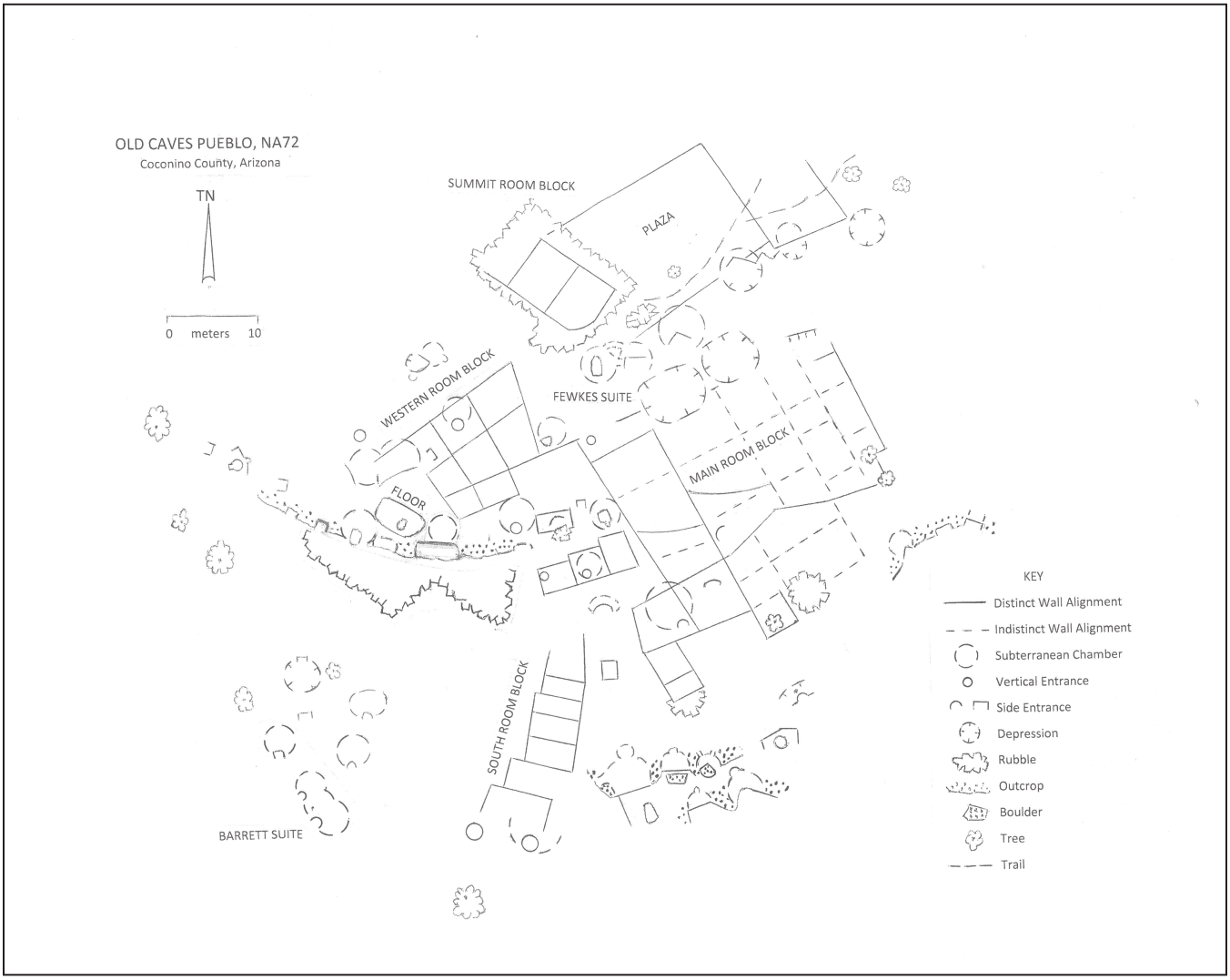

Figure 7. Author's map of Old Caves Pueblo.

Cavate Dwelling Chambers

Cavate dwelling chambers are chambers that are not enclosed within pueblo rooms. I have identified 27 cavate dwelling chambers and 10 blocked entrances. Three cavate dwelling chambers are connected to form a three-room suite, three pairs of connected cavate dwelling form three two-room suites, one cavate dwelling chamber is a back room behind a bedrock floor or dugout, and 27 cavate dwelling chambers appear to be stand-alone dwellings.

Cavate dwellings were most often excavated into cliffs of consolidated bedrock, but they were also excavated into smaller outcrops of consolidated bedrock, and in a few cases, the site occupants excavated into loose sediments to expose bedrock into which they tunneled. Cavate dwellings constructed into cliffs of consolidated bedrock are present in four areas of the site. First, five cavate dwellings have been excavated into the rimrock on the outer rim of the crater south of the plaza. Second, four cavate dwellings have been excavated into outcrops on the western slope. Third, ten cavate dwellings have been excavated into a line of cliffs that runs in an arc around the western and southern slopes of the crater. Rubble in front of this arc of cavate features may represent rooms or courtyards. Fourth, four cavate dwellings have been excavated into a set of cliffs farther down the southern slope of the crater. Other cavate dwellings have been excavated into smaller bedrock outcrops exposed on the surface around the site. Four cavate dwellings have been excavated into the southwestern plaza. Eight cavate dwelling chambers have been excavated into the southwestern slope, where it was sometimes necessary to excavate into loose sediments to expose bedrock. Two cavate dwellings have been excavated into the southern slope at the base of the southern room block.

The type of entryway (vertical or horizontal) was evident for all 37 of the cavate dwelling chambers; 8 were vertical, 28 were side, and 1 was a stepped entryway. The cavate dwellings excavated by Fewkes (see Figures 2 and 3 above) are examples of vertical-entrance cavate dwellings; Figure 8 depicts a side-entry cavate dwelling south of the main room block. Vertical entrances generally dropped down into the side, not the center, of the chamber. Two vertical entrances were keyhole- or T-shaped. It was possible to access the interiors of 27 of the cavate dwelling chambers in order to ascertain the plan of the chambers, estimate the floor area, and record other characteristics of the chambers. Sixteen chambers were circular, 7 were oval, 3 were rectangular, and 1 was sub-rectangular. Roofs were generally domed. The estimated area of the cavate dwelling chambers ranged from 4 m^2 to 28.3 m^2 and averaged 12.2 m^2. Two cavate dwellings incorporated stone masonry walls. One had a stone masonry wall in front and on the two sides, and the other had a stone masonry side wall.

Eight of the 27 accessible cavate dwelling chambers lacked internal features, while 19 contained from one to four internal features (Table 3). Internal features included 6 passageways between chambers, 1 back passage and bin between chambers, 6 tunnels, 2 vents, 1 vent or skylight, 1 vent or posthole, 2 alcoves, 8 storage chambers, and 2 recesses. (Storage chambers were defined as small [less than 1 m^3] recesses in walls and may have functioned as storage bins. Alcoves were defined as large [greater than 1 m^3] recesses in walls and may have functioned as storage spaces or storerooms.)

Cavate dwellings (averaging 12.2 m^2 in floor area) are much smaller than pueblo rooms (averaging 23.5 m^2 in floor area), and the floor plans differ from the floor plans of Sinagua pithouses and pueblo rooms as reported by Colton (1946). Still, the plastering of walls, presence of fire pits, and smoke blackening of ceilings reported by early investigators, as well as the presence of internal storage features reported by early investigators and observed in my study, all support the interpretation that the features were residential, although they may have had a somewhat different function than pueblo rooms, such as temporary or seasonal use.

Table 3. Distribution of Internal Features in Cavate Dwelling Chambers

Number of Internal Features	Frequency
0	8 chambers
1	8 chambers
2	7 chambers
3	3 chambers
4	1 chamber
Total	27 chambers

Bedrock Floors or Dugouts

Bedrock floors or dugouts are leveled areas of bedrock open to the sky and usually cut into bedrock slopes. Figures 9 and 10 illustrate an example of a bedrock floor or dugout on the western edge of Old Caves Pueblo. I have recorded nine of these, eight of which were rectangular and one of which was sub-rectangular. They ranged in size from 4 to 19.3 m^2, averaging 10.8 m^2. All the bedrock floors had at least one subfeature; 7 had one subfeature, 1 had two subfeatures, and 1 had four subfeatures. Subfeatures included 6 cellars, 4 bins, 1 entryway, 1 ventilator shaft, and 1 posthole.

Suites

Ten cavate chambers and three bedrock floors were interconnected with other chambers or floors to form six suites. These included 1 three-chamber suite, 3 pairs of cavate dwelling chambers, 1 bedrock floor and back room, and 1 pair of bedrock floors (one of which had a cellar). In the three-chamber suite (see Figures 4 and 5, above) the northwestern and southeastern chambers had side entrances, and the central chamber, which had a vent or skylight in its ceiling, was connected to the northwestern and southeastern chambers by means of passageways. In the suite Fewkes investigated, two chambers were connected by a passageway and tunnels into a shared storage bin. In another suite, two chambers were connected by a passageway. In another, two chambers were connected by a small tunnel, perhaps a ventilator or pass-through. In yet another suite, a bedrock floor or dugout had a cellar, which in turn had a

Figure 8. Photograph of side-entry cavate dwelling south of the main room block.

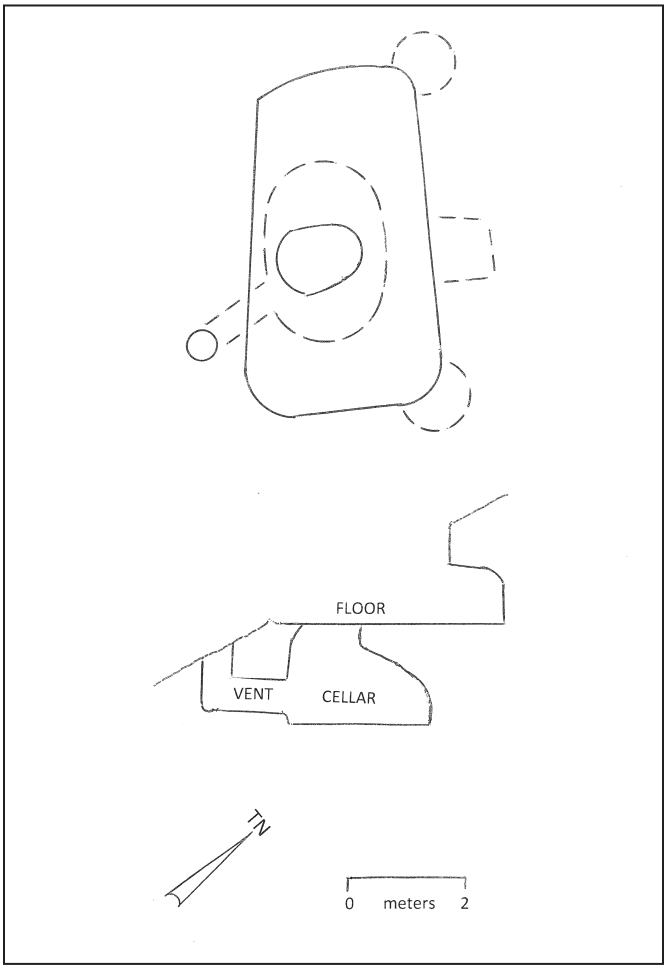

Figure 9. Schematic plan and section of floor or dugout on the west side of Old Caves Pueblo.

Figure 10. Photograph of floor or dugout on the west side of Old Caves Pueblo, view to southeast.

ventilator tunnel leading to a ventilator shaft in the floor of the second bedrock floor or dugout.

Cavate Cellars

Cavate cellars are chambers excavated under the floors of pueblo rooms or bedrock floors (or dugouts). Figures 11 and 12 illustrate a side-entry cavate cellar in a pueblo room in the southwestern corner of the main room block. Figures 9 and 10 below illustrate a vertical-entry cavate cellar under a bedrock floor or dugout.

I recorded 14 cavate cellars, eight of which were still open and six of which were filled with rock. Eight of the cavate cellars were in masonry rooms, and six were in bedrock floors or dugouts. None of the cellars were in cavate dwellings. Ten of the cavate cellars were top entry, and four were side entry. Seven of the open cavate cellars were circular and one was oval. Estimated floor area ranged from 3.0 to 19.6 m^2 and averaged 6.9 m^2. Four of the open cavate cellars contained no subfeatures, two had one subfeature, one had two subfeatures, and one had three subfeatures. Subfeatures included 1 alcove, 2 tunnels, 1 slot ventilator, and 3 shaft and tunnel ventilators. Shaft and tunnel ventilators are associated with cellars.

In their investigations of New Caves Pueblo, Kamp and Whittaker (2009) found that the "basements" that Colton reported at that site were masonry-lined pithouses constructed inside courtyards. Kamp and Whittaker call these features "sheltered pit structures" and interpret them as dwellings. These sheltered pit structures differ in form and function from the cellars at Old Caves Pueblo, which are cavate chambers with few internal features and which were probably used as storage facilities, although the shaft and tunnel ventilators so common in Old Caves Pueblo cellars are not features usually associated with storage facilities. Although I observed no features similar to the sheltered pit structures of New Caves Pueblo in my investigations at Old Caves Pueblo, my study did not entail excavation, unlike the Kamp and Whittaker investigations at New Caves Pueblo.

Open Spaces

In addition to the walled plaza on the crater rim, described above, other open spaces are present within the site. One open area is bounded by the western room block, the main room block, and the southwestern arc of cavate chambers. This triangular area is 12 m on a side with a 5-by-5-m area on the east, having a total area of 97 m^2. It contains a couple of cavate dwellings and a possible row of three rooms, two of which contain cellars.

Another open area is an inverted L-shaped area south of the main or central room block and the lower tier of cavate features. The leg of the L runs about 10 m northeast-southwest and is about 2 m wide (northwest-southeast), while the base of the L is a 4-×-4-m area. This

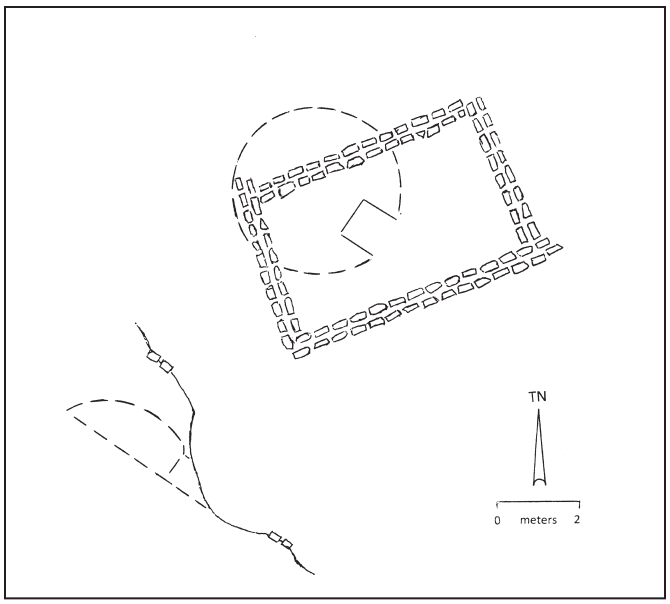

Figure 11. Schematic plan and section of pueblo room in the southwest corner of the main room block with side-entry cavate cellar.

Figure 12. Photograph of side entry into cavate cellar inside pueblo room in the southwest corner of the main room block.

open area thus covers about 36 m^2. To the northeast of this area is a 3-×-6-m access corridor.

A third open area is west of the southern room block and south of the arc of cliffs containing cavate features and running along the southwestern and western edges of the site. This open area is triangular, about 15 m on a side, and covers over 115 m^2. It contains eight cavate dwellings, including the suite of three cavate dwellings, and is open to the south and west.

Access

It is unclear how the walled plaza space on the crater rim might have been accessed. Rather than constituting evidence of a constructed gateway and passageway, breaks in the northeastern wall and a space between the southern wall of the summit room block and the southern wall of the walled plaza might have resulted from modern traffic. A distinct wall runs down the eastern side of the southern slope. A gap between the northern end of this wall and the eastern cavate dwelling just below the plaza on the crater rim might have been the main entrance into the pueblo. As mentioned above, the eastern wall also has a gap below its southern end, which may be an access corridor into the southern open area. The southern and western sides of the pueblo are defined by low cliffs into which cavate chambers have been excavated.

Artifacts

Information about the range of artifacts at Old Caves Pueblo comes from Barrett (1922), Colton (1946), and Powell (1887, 1891, 1892). Fewkes (1904) does not provide information on artifacts from the site. Documentation of the Babbitt Collection at MNA and the Bolles Collection at Gilcrease Museum offers some information on artifacts from Old Caves Pueblo, although more intensive analysis of both collections is warranted. I have not systematically recorded surface artifacts at Old Caves Pueblo, although I have noted the presence of pottery types, flaked stone, and ground stone. More detailed recording of surface artifacts is needed.

Pottery

Currently the only published quantitative distribution of pottery from Old Caves Pueblo is the judgmentally collected assemblage of 99 sherds analyzed by Colton (1946:38). The sherds were about evenly divided between unpainted (52 sherds) and painted (47 sherds). The unpainted sherds were overwhelmingly Alameda Brown Ware, including Winona Brown (5 sherds), Turkey Hill Red (16 sherds), Sunset Red (26 sherds), and Elden Corrugated (1 sherd). Four sherds of Kiet Siel Gray from the Kayenta region were the only nonlocal plainware pottery in the assemblage. Tusayan White Ware, represented by 12 sherds of Wupatki Black-on-white and 8 sherds of Kayenta Black-on-white, was the most common painted ware. Little Colorado White Ware was represented by four sherds of Walnut Black-on-white. The assemblage also contained two sherds of Verde Black-on-gray. Orange ware pottery was most commonly Winslow Polychrome (9 sherds), followed by Tusayan Polychrome (6 sherds), Jeddito Black-on-orange (2 sherds), and Klageto Black-on-orange (1 sherd). The

assemblage also contained three sherds of Jeddito Black-on-yellow.

In my examination of Old Caves Pueblo, Alameda Brown Ware is the most common pottery on the site by far. Babbitt's journal, which documents his collection, lists brown-ware jars, bowls, ladles or scoops, cups, and a rattle, which presumably are Alameda Brown Ware. San Francisco Mountain Gray Ware, made by the Cohonina, is present but rare. Although the Sinagua briefly made a corrugated pottery type called Elden Corrugated, most of the corrugated pottery I have seen at Old Caves Pueblo is Tusayan Corrugated from the Kayenta area about 160 km northeast of Flagstaff.

Among the black-on-white pottery I have observed at Old Caves Pueblo, Little Colorado White Ware seems to be most common, followed by Tusayan White Ware; Cibola White Ware is present but rare. Little Colorado White Ware types include Walnut Black-on-white and Leupp Black-on-white. Tusayan White Ware types include Flagstaff Black-on-white and Tusayan Black-on-white. The rare sherds of Cibola White Ware have been too small to classify as to type.

Polychrome pottery observed at Old Caves Pueblo includes Tusayan Polychrome (which Colton also reported) as well as Kiet Siel Polychrome and Kayenta Polychrome (which were not in Colton's assemblage). A single sherd of White Mountain Red Ware was too small to classify as to type.

Portions of the Bolles Collection at Gilcrease Museum are accessible to the public in open storage and include three pots from Old Caves Pueblo: a Kayenta Black-on-white bowl, a Kayenta Polychrome bowl with handle, and a Homol'ovi Polychrome bowl.

Flaked Stone

Babbitt's journal lists numerous projectile points, which have not been analyzed. Flaked stone artifacts visible on the surface of the site today are predominately flakes of rhyolite and obsidian with rare specimens of chert.

Ground Stone

Although early explorers and looters reported that ground stone artifacts were common at the site, they are not widely visible today. Mano and metate fragments can still be seen. A volunteer artifact analyst at MNA reports having seen a basalt cylinder at the site (Jen Blue: personal communication, 2020). Babbitt's journal lists polished stone hammers and axes, as well as items of jewelry such as nose plugs, earlobe plugs, stone beads, and rings. Babbitt's journal also lists multiple items of turquoise, including a bird pendant, ear bobs, beads, a mosaic, and scraps (indicating that turquoise was processed at Old Caves Pueblo). Babbitt's journal also reports nodules of white and red paint.

Other Artifact Types

Old Caves Pueblo undoubtedly once preserved abundant perishable items, now known only from the reports and collections of looters. The Milwaukee resident who led Samuel Barrett to Old Caves Pueblo found a sandal in one of the cavate lodges. Babbitt's journal lists a painted wooden bird effigy, bone awls and needles, and shell beads and bracelets.

DATING

Old Caves Pueblo has produced only one tree-ring date, a noncutting date of AD 1253 (Robinson and Cameron 1991:5). Thus, dates assigned to the site have been based on the pottery. Colton (1946:38–39) dated the site from AD 1250 to 1300 and based the beginning date on the absence of Flagstaff Black-on-white and the predominance of Wupatki Black-on-white in his collection. The end date was based on the presence of Jeddito Black-on-yellow. Pilles (1996) dated the site from AD 1250 to 1400. Bernardini and Brown (2004) dated the site from AD 1250 to 1350, citing Colton (1946) and Pilles (1996).

Wilcox (2011:75) hypothesized that the occupation of the site ended about AD 1275 and that the limited number of late (e.g., Winslow Orange Ware and Jeddito Yellow Ware) sherds that have been reported at the site were deposited by a remnant population or people making pilgrimages to the site. The Homol'ovi Polychrome bowl in the Bolles Collection at Gilcrease was probably in a burial, however, which would indicate use of the site up to about AD 1325. Although Colton (1956) dated Homol'ovi Polychrome to AD 1300–1400, and Breternitz (1966:78) concurred, Hays-Gilpin et al. (1996:70) have more recently noted that Homol'ovi Polychrome is rare (2% of the Winslow Orange Ware) at Homol'ovi IV (AD 1260–1280), rare (6% of the Winslow Orange Ware) in early (AD 1275–1300) deposits at Homol'ovi III, and most common (33% of Winslow Orange Ware) in late deposits (mid-1300s [Hays-Gilpin et al. 1996], AD 1330–1375 [Adams 1996:7]) at Homol'ovi III, indicating that production of this type began between AD 1300 and 1330. I interpret the data as indicating that the occupation of Old Caves Pueblo lasted from about AD 1250 to 1330.

OLD CAVES PUEBLO AND THE LAST DAYS OF THE SINAGUA IN THE FLAGSTAFF AREA

Old Caves Pueblo was arguably the last pueblo in the Flagstaff area to be occupied (Bernardini and Brown 2004; Pilles 1996). The Wupatki area had been previously depopulated around AD 1250, although Juniper

Terrace might have persisted to about AD 1300 (Pilles 1996). Occupation of Anderson Mesa continued to about AD 1375 (Bernardini 2005: Figure 3.15; Bernardini and Brown 2004; Pilles 1996), and occupation of the Verde Valley continued to about AD 1350 or 1400 as well (Pilles 1996). The last four major villages in the Flagstaff area were Elden Pueblo, Turkey Hill Pueblo, Old Caves Pueblo, and New Caves Pueblo, and the occupation of Old Caves Pueblo seems to have outlasted the other three. Because Old Caves Pueblo appears to have been the last of the Flagstaff pueblos to have been occupied, its characteristics provide evidence for evaluating explanations for the depopulation of the Flagstaff region, including conflict and climate change.

Defensive Sites and the End of the Sinagua

Kamp and Whittaker (2009; see also Whittaker and Kamp 2012) remark on the greater emphasis on defense in site positioning in the Flagstaff area beginning about AD 1250, when peoples of the Flagstaff area constructed multiple sites on hilltops, including Old Caves Pueblo, New Caves Pueblo, Strawberry Crater, and Rattlesnake Crater. On the other hand, evidence of burning is lacking at Old Caves Pueblo. We have almost no scientific descriptions of skeletal remains from the site, but none of the professional archaeologists or looters have mentioned scattered skeletal remains or evidence of trauma. Old Caves Pueblo would have been isolated in the waning years of its occupation, with the nearest cluster of other pueblos 30–50 km away on Anderson Mesa.

Climate Change

The Highway 89 tree-ring study indicates that the AD 1251–1350 period included 18 wet years, 64 average years, and 18 dry years (Salzer and Dean 2007: Table 9.4), so precipitation may not have significantly influenced the depopulation of the Flagstaff area. On the other hand, Salzer and Dean (2007: Table 9.7) report no abnormally warm years from AD 1251 to 1350, while there were two significant cold snaps during this period: AD 1258–1271 (14 cold years) and AD 1330–1364 (35 cold years), with the latter cold snap corresponding to the period when I suggest the occupation of the site ended. The cold snap probably does not fully explain the depopulation of Old Caves Pueblo and the Flagstaff area, however, because (as mentioned above) occupation of the Anderson Mesa pueblos, only 30–50 km south and 60–150 m lower than Old Caves Pueblo, continued to about AD 1375.

CONCLUSIONS

My interest in Old Caves Pueblo was piqued by popular accounts and the recognition that despite well over a century of investigations at the site, it is largely under-recorded. The best map of the site is Colton's (1932: Figure 10, 1946: Figure 17), which depicts cavate entrances as circles and does not depict the cavate chambers, unlike Mindeleff's (1896: Plate 25) map of the Mindeleff Cavate Site in the Verde Valley or Colton's (1946: Figure 20) map of Turkey Tank Caves. The only quantitative data on pottery from the site is Colton's 1946 analysis of 99 sherds. My study of Old Caves Pueblo does not fundamentally alter the general understanding of the site, but it shows that some characterizations of the site are incorrect. For example, most of the cavate features are not cellars, but instead are stand-alone dwellings. Second, the distinction between vertical entrances at Old Caves Pueblo versus lateral entrances at New Caves Pueblo and Turkey Tank Caves is not confirmed. In addition, the current investigation has disclosed new insights about the site. The pueblo can be divided into four room blocks. One block of two rooms is adjacent to the plaza and thus may have functioned in community ritual. The other three room blocks, of 7 rooms, 8 rooms, and approximately 30 rooms, appear to have been primarily residential, and they may represent the presence of three distinct social groups (conceivably immigrants) at the site. Community planning is evident in the way the plaza space was reserved on the rim of the crater and at the highest point of the site. The positioning of cavate features seems to have been determined primarily by the locations of outcrops and cliffs. The outcrops and cliffs were avoided by the builders of the room blocks but remained open for construction of cavate dwellings. Cavate dwellings appear to be smaller than pueblo rooms, however, so they may have had sheltered social groups or activities somewhat different than the pueblo rooms. Aerial photography and better mapping of the site indicates both defensive attributes such as the eastern wall, as well as possible access points and circulation patterns. Perhaps most important, the current study has demonstrated that much research potential remains at Old Caves Pueblo through additional documentation of the pueblo, the cavate chambers, and surface artifacts. In addition, further analysis and documentation of the Babbitt Collection at MNA and the Bolles Collection at Gilcrease Museum would provide better insights regarding the artifact assemblage at the site, the site date, the activities that occurred at the site, and the social organization and trade relations of the site occupants.

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REEVALUATING KAYENTA MIGRATION SCENARIOS: A REVISION OF THE GOAT HILL PHASE IN THE SAN CARLOS SAFFORD AREA OF SOUTHEASTERN ARIZONA

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We review and evaluate the Goat Hill phase in the San Carlos Safford area of southeastern Arizona that represents the archaeological impacts of a late prehispanic migration of Ancestral Pueblo groups. Due largely to an overlap with the Bylas and Safford phases, we propose a revision. We base this revision on the assemblage found at the Goat Hill site and cultural loci specifically linked via a predominance of Maverick Mountain pottery. In terms of an associated migration narrative, this revision includes an assessment of Maverick Mountain ceramics, corrugated pottery, perforated plates, and ceramic figurines, as well as chipped and ground stone artifacts. We address the Goat Hill site structure, residential and ritual architecture, mortuary patterns, chronology, and geographic extent of the Goat Hill phase, as well. We outline and discuss the relationship of the Maverick Mountain pottery design, style, and manufacturing method; the relevance of corrugated pottery to the Goat Hill phase using sherd count data, and the potential significance of perforated plates. Other elements of the material culture we discuss are specific aspects of residential and ritual architecture, the importance of the shift from flexed inhumation to subfloor infant inhumation and secondary adult urn cremation, and how the chronology of the Goat Hill phase relates to the Bylas and Safford phases. We additionally define the Maverick Mountain Complex and its relationship with the Goat Hill phase. Finally, we investigate room count estimates from several late prehispanic archaeological areas to situate the chronology and nature of the late thirteenth-century Kayenta migration, Maverick Mountain Complex, and Goat Hill phase in a regional perspective. Specifically, we argue the origins of the Goat Hill phase relate to increased internecine violence, critique some aspects of currently proposed models, and suggest that the size of an immigrant population does not necessarily correlate to the overall impact of the migration process.

A CRITICAL REVIEW

Sizable changes in ceramic exchange, proximity of population aggregation, and interregional interaction characterize the archaeological record of late prehispanic southeastern Arizona. These shifts are central in discussions regarding the long-distance migration of northeastern Arizona Ancestral Pueblo groups to southeastern Arizona during the late thirteenth century. Recently, archaeologists ascribe the localized impacts of this intrusion of a different ethnic group with distinctive architectural, ceramic, and mortuary heritages into what is termed the *Goat Hill phase* of the Classic period in the San Carlos Safford area (SCSA). Neuzil (2005) innovatively proposed the Goat Hill phase (AD 1275–1325), based on Woodson's (1995, 1999) excavations at the Goat Hill site, AZ CC:1:28(ASM). However, without specifying the nature of the evidence, Neuzil inferred that the Millses (1978) work at the Buena Vista Ruin, as well as Brown's (1973) and the Eastern Arizona College (EAC) investigations at the Spear Ranch Ruin, qualified as Goat Hill phase components. To these sites, Neuzil (2005) suggests the presence of features associated with the Goat Hill phase were identified at the Dailey (Hall and Clark 2004) and Epley Ruins (Jones and Montgomery 2013; Lascaux et al. 2019) sites. Furthermore, based on Neuzil's (2005) and Brown's (1973) survey of the Yuma Wash site, as well as others' surveys of the Smith Tank, Fischer Mesa, and Marijilda sites (Brown 1973; Neuzil 2005; Neuzil and Woodson 2014), Neuzil (2005, 2008) added these to the list of Goat Hill sites. Neuzil (2005, 2008; Neuzil and Woodson 2014) defined the Goat Hill phase based on the predominance of Maverick Mountain pottery, which included Maverick Mountain, Tucson, Prieto, and Nantack Polychrome, as well as Maverick Mountain and Tucson Black-on-red. Neuzil (2005) additionally includes the presence of perforated plates and the near absence of corrugated pottery as material signatures for the Goat Hill phase. Neuzil classifies the residential architecture

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as "clustered room blocks," meaning small room block units arranged around open plaza or work areas (Neuzil 2008; Neuzil and Woodson 2014:373, 376). However, the D-shaped kiva represents the most unexpected and nonlocal aspect of the Goat Hill phase assemblage (see Woodson 1995, 1999). Using this collection of traits, Neuzil followed hypotheses proposed by Haury (1958), Wasley (1962), Brown (1973), Lindsay (1987), and Woodson (1995) and attributed the Goat Hill phase to a late thirteenth-century Kayenta-Tusayan migration. She also tabularized these attributes to summarize her proposed Goat Hill phase (Table 1). However, as we argue in this article, this list of traits does not entirely match with those outlined in her text (Neuzil 2005).

As the Goat Hill phase was based specifically on the features and artifacts found at the Goat Hill site it would be logical to determine the territorial extent of this complex by identifying similar occurrences of these traits at other sites. However, Neuzil's summary often did not reference where she identified many of the assigned attributes. Neuzil and Woodson (2014:Figure 9.7) also acknowledged that in the late thirteenth-century the Bylas and Goat Hill phases chronologically overlapped, yet they combined traits associated with both of those phases, as well as the later Safford phase. Although it seems to rely on cross-referenced, tree-ring-dated pottery types, the Goat Hill site assemblage included few well-dated intrusive types. Another problem is that some Goat Hill phase traits have been underrepresented or, in our opinion, inaccurately depicted in discussions of the phase. This is primarily due to the limited and confounding dataset available for the SCSA. For example, based on the near absence of corrugated pottery at the Goat Hill site (Woodson 1999:Table 1), Neuzil (2005:102) concluded that its peak use occurred during the Goat Hill phase. Overall, this presents an awkward dilemma that given the exclusive nature and unknown extent of the expression, together with the absence of critical information pertaining to material culture, requires either the dissolution of the Goat Hill phase or a major revision. Nonetheless, the Goat Hill site represents a striking departure from the Bylas phase norm, exhibits obvious Tsegi phase Kayenta and Hockovi phase Tusayan traits, and is significantly distinct from subsequent Safford phase assemblage. Therefore, when applied restrictively the Goat Hill phase retains merit, and we recommend a revision rather than its rejection.

Consequently, the goals of this study are threefold. First, we propose a revision of Neuzil's (2005, 2008) Goat Hill phase based on the material assemblage found at the Goat Hill site identified by Brown's (1973) survey and Woodson's (1995, 1999) excavations. This revision includes assessments of Maverick Mountain pottery, corrugated pottery, perforated plates, and ceramic figurines, as well as chipped and ground stone artifacts. We also address the Goat Hill site structure, residential and ritual architecture, mortuary patterns, chronology, and geographic extent of the Goat Hill phase. Second, as they pertain to the nature of the Goat Hill phase, we outline and evaluate several aspects of material culture in detail. These include discussions of the relationship of the Maverick Mountain Complex to the Goat Hill phase, Maverick Mountain pottery design, style, and manufacturing methods, the relevance of corrugated pottery to the Goat Hill phase using sherd count data, and the potential traditionally argued significance of perforated plates. Other elements of the material culture discussed are specific aspects of residential and ritual architecture, the importance of the shift from flexed inhumation to subfloor infant inhumation and secondary adult urn cremation, and how the chronology of the Goat Hill phase relates to the Bylas and Safford phases. Finally, we investigate room count estimates associated with the various late prehispanic Western Ancestral Pueblo, Northwestern Mogollon, and Southeastern Arizona archaeological areas to explore the nature of the Kayenta migration, the Maverick Mountain Complex, and the Goat Hill phase and the role of internecine violence in these events.

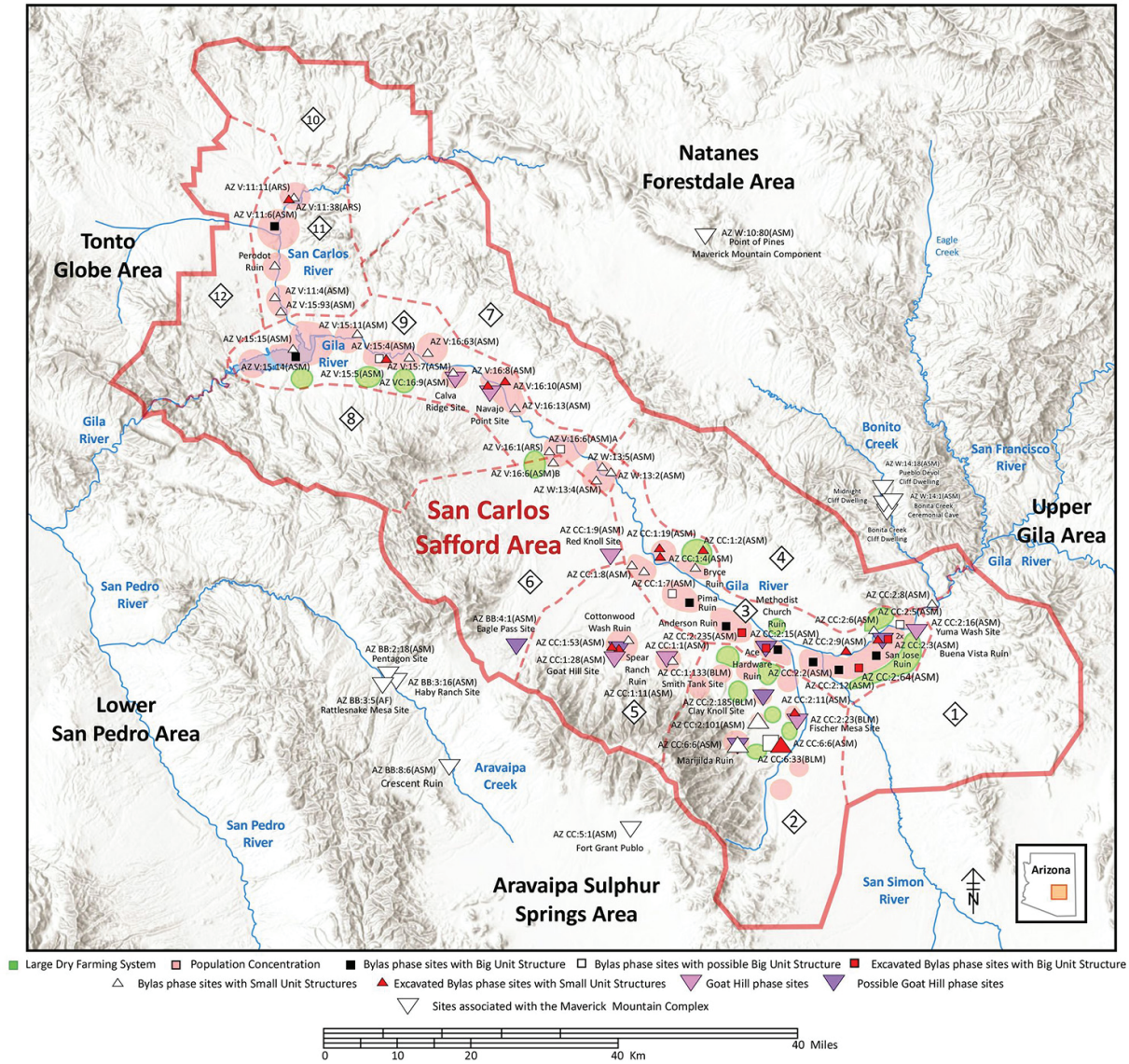
Table 1. Summary of Goat Hill Phase Trait List

Phase	Goat Hill
Date Range	AD 1275/1300–1325
Architecture	"Clustered room blocks" Multiple room blocks clustered around an open space Most constructed of cobble reinforced adobe, though some masonry architecture is seen Late pit houses underly some room blocks
Ceramics	Dominated by utilitarian wares, both plain and corrugated Cibola White Ware White Mountain Red Ware San Carlos Red-on-brown Middle Gila Buff Ware, Safford variety Early Zuni Glaze Ware Maverick Mountain Series Early Salado polychrome
Social Organization	Ancestral Pueblo migrants played a large role Increased aggregation

THE SAN CARLOS SAFFORD AREA

Geographically, the SCSA represents the large elongated intermontane basin associated with the Gila River and its tributaries between the vicinity of Coolidge Dam and the Sanchez Gorge located east of Safford (Figure 1). This environmentally diverse area encompasses over 2,270 mi.^{2} or 5,881 km^2. Although much of the farmland paralleling the Gila River in the eastern portion of the basin is privately owned, the SCSA is largely administered by government institutions.

For data management and better variability tracking, we divide the SCSA into twelve geographic districts (see Figure 1). These districts average approximately 490 km^2, represent areas of relatively large residential site clusters, and reflect subtle internal differences in material culture. Although few sites have been recorded within the Black Hills District, it is located along the eastern edge of the SCSA and encompasses 655 km^2. The Stockton Wash District covers 701 km^2 and is situated on the northeastern slopes and bajada of the 10,724-foot-high Mount Graham. Centered on the eastern portion of the Gila River the Pueblo Viejo District has the highest concentration of sites with at least ten large prehispanic villages and a regional center at Pueblo Viejo, AZ CC:2:64(ASM). The Pueblo Viejo District also includes an area of about 442 km^2. Immediately to the north, south, and southwest are the Gila Mountain, Pima, and Goodwin Wash districts which cover 502,



1) Black Hills 2) Stockton Wash 3) Pueblo Viejo 4) Gila Mountains 5) Pima 6) Goodwin Wash
7) Salt Creek 8) Mount Turnbull 9) San Carlos 10) Blue Creek 11) Rice 12) Hayes Mountains

Figure 1. Map of the San Carlos Safford area with important Bylas, Goat Hill, and Safford phase sites.

422, and 570 km^2, respectively. The Salt Creek District covers 484 km^2 and the Mount Turnbull District spans 507 km^2 with Mount Turnbull at 8,284 feet above sea level. Between these districts is the San Carlos District with 471 km^2 and the second-highest concentration of prehispanic sites and another regional center located at AZ V:15:14(ASM). Centered on the lower San Carlos River and north of the San Carlos District is the Rice District, which encompasses an area of 271 km^2. On the western edge of the SCSA are the Blue Creek and Hayes Mountains districts with 489 and 367 km^2, respectively.

PROPOSED REVISIONS

The following sections detail our specific revisions to the Goat Hill phase for the categories of ceramic and lithic assemblages, site layout and location, form of residential and ritual architecture, mortuary patterns, and chronology (Table 2). We discuss individual attributes using data from the Goat Hill site, other contemporaneous sites, and adjacent areas to improve our understanding of the late thirteenth century in the SCSA and in support of our assertion to disentangling the Goat Hill phase from the Maverick Mountain Complex and the Kayenta migration narrative.

Table 2. Summary of Proposed Goat Hill Phase Revisions

	AD 1280–1310
Location	Defensive hilltop
	Settlements in upland settings
	Reuse and modification of Bylas phase compounds in river settings
Residential Architecture	Room block groups
	Connected room suites
	Rectangular hearths
	Entry Box complex
	Deflectors
	Step-up entry
	Small courtyards
Ritual Architecture	Open plazas
	D-shaped kivas
Ceramics	Assemblage dominated by both paddle and anvil, as well as coil and scrap plain ware
	Little or no corrugated pottery
	Maverick Mountain pottery and primarily locally produced
	Perforated plates
Mortuary Pattern	Subadult and adult secondary urn cremation
	Subfloor infant inhumation
	Extended supine subadult and adult inhumation
Other Traits	Slab metates
	Full-grooved axes

Maverick Mountain Pottery

The most important component of our proposed revision of the Goat Hill phase is the local advent of the Maverick Mountain ceramic series, which includes Maverick Mountain, Tucson, Prieto, and Nantack Polychrome, as well as Maverick Mountain and Tucson Black-on-red (Figure 2). The red-slipped Maverick Mountain Black-on-red decoration of jars and bowl interiors is reminiscent of complex textile patterns. It includes hatched, cross hatched, dots, and small solid rectilinear motifs within decoration panels that typically interlock with one or more bold, often-stepped, solid design elements. The decoration of the red-slipped Tucson Black-on-red found on jars and bowl exteriors is characterized by a single, large, often-stepped solid design element that horizontally traverses the vessel (see Figure 2). However, the more intricate decoration panels associated with the Maverick Mountain type are absent. For the polychrome versions of Maverick Mountain and Tucson, the decoration panels and large interlocking solid design elements are simply outlined with a narrow white line. Conversely, the decoration of Nantack Polychrome is found exclusively on bowl interiors and typically consists of one-to-four large, solid, red design elements outlined by a thin black line, which in turn is outlined by a narrow white line. Finally, the decoration of Prieto Polychrome found on bowl interiors is similar to Nantack Polychrome however the large solid red design elements were outlined in white, and the black outline was absent. However, the bowl exterior is also decorated with a large continuous semitransparent, white design element somewhat reminiscent of St. Johns Polychrome.

Based on design and style, Lyons (2003) argued that Maverick Mountain pottery is directly related to the Tsegi Orange Ware series. Following this approach, Lyons asserted there is an affiliation with Tusayan White Ware designs but stated Maverick Mountain and Tucson Black-on-red and Polychrome specifically derived from Kiet Siel Polychrome and Black-on-orange. Accordingly, Nantack Polychrome was also developed from Tusayan and Kayenta polychromes and Prieto Polychrome was associated with Machonpi Polychrome, a type made in the Hopi Mesas District of the Tusayan area (Lindsay 1992; Lyons 2014:25). A cursory review of the decoration found on Kiet Siel Polychrome and Black-on-orange, as well as Tusayan and Kayenta Polychrome, confirms Lyons's observations. However, we add that the quartered design found on many examples of Maverick Mountain Black-on-red are similar to Jeddito Black-on-orange, which is classified as a Tsegi Orange Ware and

Figure 2. Examples of: Maverick Mountain Polychrome, A and B (Clark 2011a, 2011b); Maverick Mountain Black-on-red, C (Tyberg 2000:UMC 4770); Tucson Polychrome, D and E (Images courtesy of Museum of Indian Arts & Culture/Laboratory of Anthropology, Museum of New Mexico) and F (Lyons 2012:Figure 7).

was made in the Tusayan area. Conversely, the design found on other examples classified as Maverick Black-on-red are similar to the decoration of Tuwiuca and Huckovi Black-on-orange, which were Winslow Orange Ware and made primarily in the Petrified Forest District of the Middle Little Colorado area. This observation suggests that the inspiration for Maverick Mountain Black-on-red was centered in the Tusayan area rather than exclusively in the Kayenta area, although an alternative is that the inspiration for Maverick Mountain Black-on-red developed out of the intermingling of immigrant Kayenta groups with Tusayan groups in the Tusayan area.

Corrugated Pottery

Whereas the late thirteenth-century Kayenta-Tusayan and Goat Hill decorated pottery types were stylistically similar, the most unexpected result of our overall analysis found that the respective utilitarian assemblages vastly differed. For example, within the mixture of Kayenta-Tusayan utilitarian wares, corrugated pottery was ubiquitous. However, only a trace amount of corrugated pottery was found at the Goat Hill site. Initially, it is unclear to us whether this trait was unique and restricted to the Goat Hill site or was widely shared with other sites in the SCSA. Corrugated pottery in southeastern Arizona has been used as a proxy for migration of Mogollon groups into the area, and Clark and Lengyel (2002) suggested these migrations related to the twelfth-century megadrought. This provoked greater scrutiny of the ceramic assemblages recovered at sites associated with Maverick Mountain types. Subsequently, we examined the ceramic assemblages at the Yuma Wash, Methodist Church, and Fischer Mesa sites, which were dominated by Maverick Mountain types, and found only minimal amounts of corrugated pottery. A similar pattern is present within the Reeve Ruin (Di Peso 1958) and Davis Ranch (Gerald 2019) assemblages in the Lower San Pedro area. We detected a similar decrease in the use of corrugated pottery associated with Maverick Mountain types at the Millses Houses 4 at the Buena Vista Ruin. Therefore, to backtrack and discern the origin of this trait, we extended our analysis to the Maverick Mountain component in the Point of Pines and Bonita Creek districts, as well as select districts within the Tusayan and Kayenta areas. Furthermore, to track the progression of this trait from one archaeological area to another, we examined the ceramic assemblages at the Reeve Ruin and Davis Ranch sites in the Lower San Pedro area discussed below (Di Peso 1958; Gerald 2019).

Perforated Plates

Another Goat Hill phase ceramic trait that was introduced is the shallow circular dish or plaque-like device known as the perforated plate (Figure 3). Although corrugated and obliterated corrugated examples are documented, the perforated plate is a somewhat crudely

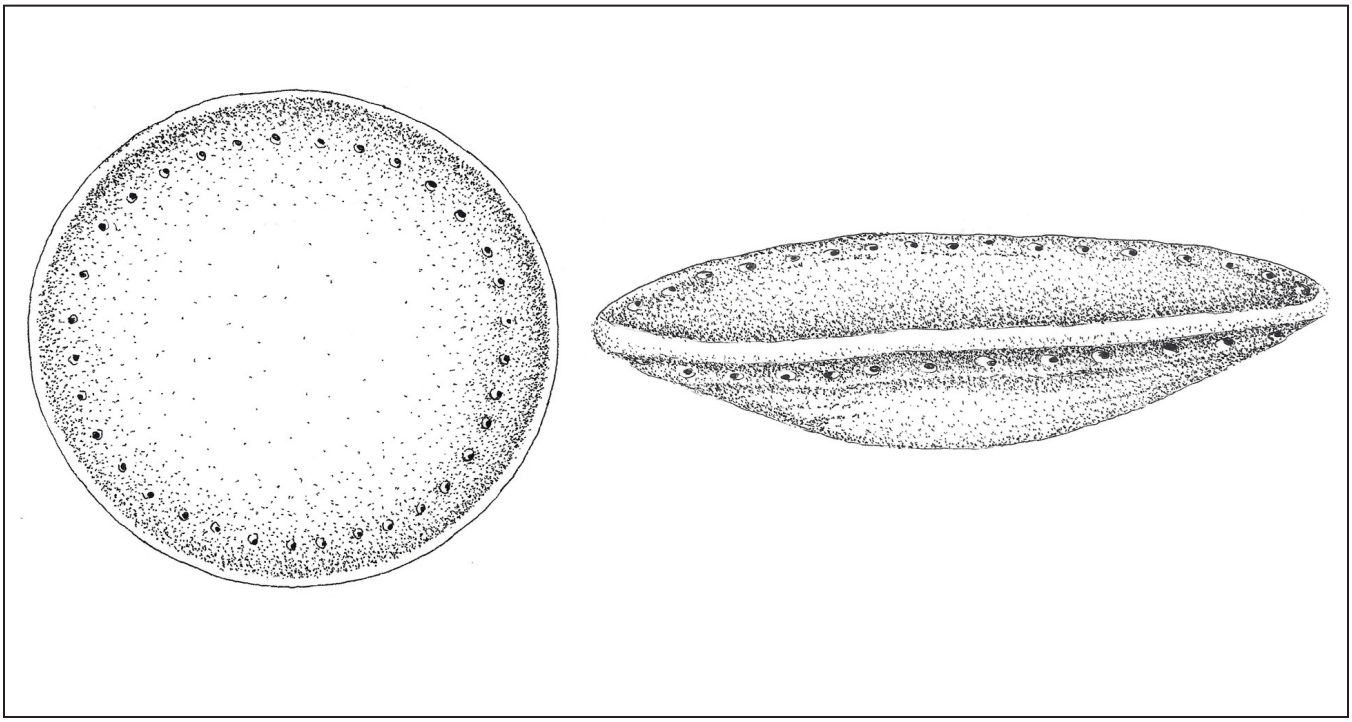


Figure 3. An artistic rendering of a perforated plate (illustration courtesy of Margaret Berrier).

made, coil-and-scraped plain ware tempered with arkosic sands that range from 13.5 cm to more than 60 cm in diameter (Lyons and Lindsay 2006:10). Typically, the last coil was flattened and folded back over the exterior edge of the plate to form a lip. Furthermore, the interior of the plate was smoothed and perforated by one or more rows of small uniform circular-shaped holes that were unevenly spaced, although many unperforated plates likely go unnoticed lacking a detailed ceramic analysis. Normally located at the base of the lip and completely piercing the plate from the interior, these holes were made by using a smooth cylindrical tool with a dull conical tip when the clay was wet. Clay displaced by the perforation was often drawn back, clogging the exterior of the hole as the tool was extracted. Given the slight tilt of the plate, the holes seem to have been made perpendicular to the angle of the edge. Although Lyons and Lindsay note a few exceptions in the patterned placement of holes and exterior decoration, the examples found in the SCSA are virtually identical to perforated plates dating to the Tsegi phase and found in the Kayenta area, where the perforated plate is most commonly found. Perforated plates have been argued by many, notably Lyons (2003, 2019; Lyons and Lindsay 2006), based on many lines of robust data, such as that from the Davis Ranch site (Gerald 2019; Lyons 2019) to have acted as base molds or pukis in the production of pottery. We suggest a secondary function for perforated plates, but do not deny the probable main function as pottery production implement.

Ceramic Anthropomorphic Figurines

Upon surveying the local collection of artifacts recovered from the Goat Hill site made before his investigation, Brown (1973) noticed a small clay figurine. Figure 4 showcases examples of ceramic anthropomorphic figurines. Based on Brown's calculations the anthropomorphic effigy was approximately 13.1 cm tall with the head 4.93 cm and the neck 2.41 cm thick. Based on his drawing, the figurine's features included an elongated neck and spoon-shaped head with a flat face, a simple pinched nose, slight dotted indentations for eyes, and a slight line indentation representing a month. This figurine was unlike locally made, Late Formative period examples with coffee bean-shaped eyes found at the end of scoop handles, such as those recovered at AZ V:15:10(ASM) (Johnson and Wasley 1966) and AZ CC:1:19(ASM) by Rule (1993). He compared this artifact to similar examples that Kidder and Guernsey (1919:Figure 62) recovered at Long House Ruin in the Kayenta area. A similar figurine was found at the Antelope House cliff dwelling in the Chinle area (Morris 1986). These included a smaller, yet nearly identical, anthropomorphic head and neck figurine that measured about 5.6 cm tall with a head and neck 2.5 cm and 1.2 cm, respectively. The second figurine was larger and consisted of a head that was 6.0 cm tall and 7.0 cm wide with the base of a broken neck. The facial features were the same, except the mouth was represented by

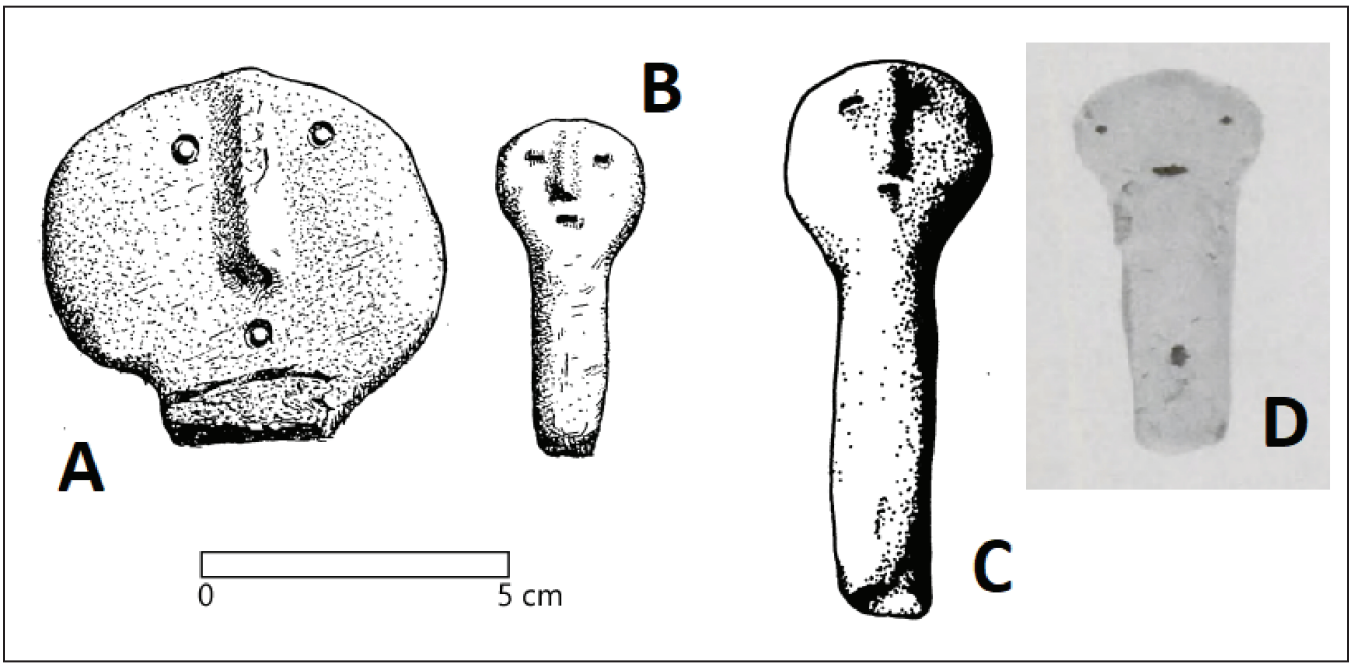


Figure 4. Example of ceramic anthropomorphic figures. A and B) Long House Ruin in the Kayenta area; C) Goat Hill site in the San Carlos Safford area; D) Antelope House cliff dwelling in the Chinle area (from Brown 1973; Kidder and Guernsey 1919; Morris 1986).

a dotted indention identical to those used for the eyes.

Chipped and Ground Stone

Compared to ceramics, the Goat Hill phase chipped stone and ground stone assemblages are rather small and unremarkable. Therefore, our review does not represent a revision per se, as much as it points out the prosaic nature of these artifact classes that have not previously been addressed as traits. For example, the chipped stone assemblage from the Goat Hill site included 3 nondescript projectile points, 1 denticulate, 3 bifaces, 3 unifaces, 3 modified flakes, 11 chipped hoes, and 9 hammerstones, as well as 132 pieces of debitage consisting of 108 flakes, 14 blades, and 10 pieces of nondescript shatter (Woodson 1995). The ground stone assemblage consisted of a T-shaped stone ("fergolith"), a shaft straightener, a full-grooved ax, a stone spindle whorl, 16 manos, and 6 metates of which 3 were slab, one was a basin, one was a trough, and one was represented by a fragment too small to classify (Woodson 1995). From among the chipped stone and ground stone assemblages, the only artifacts that would suggest an Ancestral Pueblo affiliation was a full-grooved ax and four slab or basin metates.

Territorial Extent and Site Structure

Some Goat Hill phase sites, particularly the well-known Goat Hill site, appear to have been newly founded without evidence of earlier occupations. This has led some investigators to propose that many Goat Hill phase sites were restricted in placement to unoccupied, marginal settings (Clark et al. 2013). However, we note that several Goat Hill phase occupations occurred at previously inhabited sites, whereas other Goat Hill phase settlements included the use and remodeling of late Bylas phase structures. We interpret the choice of site location, given the proximity to critical resources, as an outcome of the adoption of terrain features that for one reason or another offered significant tactical and strategic advantages. We identify the highest concentration of Goat Hill phase sites exist in the eastern portions of the SCSA and extend to at least Calva in the San Carlos District (see Figure 1). There may have been one or two Goat Hill phase settlements in the Rice District, as well.

In terms of site structure, the Goat Hill phase also featured the introduction of a distinctive layout. This involved the arrangement of plaza-originated residential room blocks as dispersed groupings situated on open terrain, or as tightly clustered groups situated on highly defensible narrow ridges or steep hilltops. For example, the Goat Hill site consisted of two aggregated single-story room blocks that formed a defensive circuit with restricted entry gained only through two narrow passages. These room blocks faced inward onto a semi-subterranean kiva that was centered within a plaza. This seems to mirror the Tsegi phase, Kayenta hilltop defensive site structure documented in the Klethla Valley District (Haas and Creamer 1993). In the Kayenta

area, examples similar to the Goat Hill phase site structure can be found at the Tachini Point and Valley View ruins (Haas and Creamer 1993), Segazlin Mesa (Lindsay 1969), Neskahi Village (Hobler 1964), and Small Jar Pueblo (Lindsay et al. 1968) sites. Figure 5 provides maps of the Goat Hill phase site structure in the SCSA, and we discuss examples from the Kayenta, Tusayan, Hopi Buttes, and Zuni areas later in the paper. We note that the layouts of Reeve Ruin (Di Peso 1958) and Davis Ranch (Gerald 2019) were initially constructed as room blocks with later additions and compound walls, and that at least Davis Ranch may have initiated as a Kayenta pit house settlement.

Residential and Ritual Architecture

Other pervasive Ancestral Pueblo traits found at the Goat Hill site are associated with residential architecture. This included walls built of coursed masonry with abundant adobe mortar that often-incorporated boulders and jacal partitions used in the construction of 38 surface rooms. Overall, room sizes tended to be small and typically ranged between 3.5 m^2 and 13 m^2 of

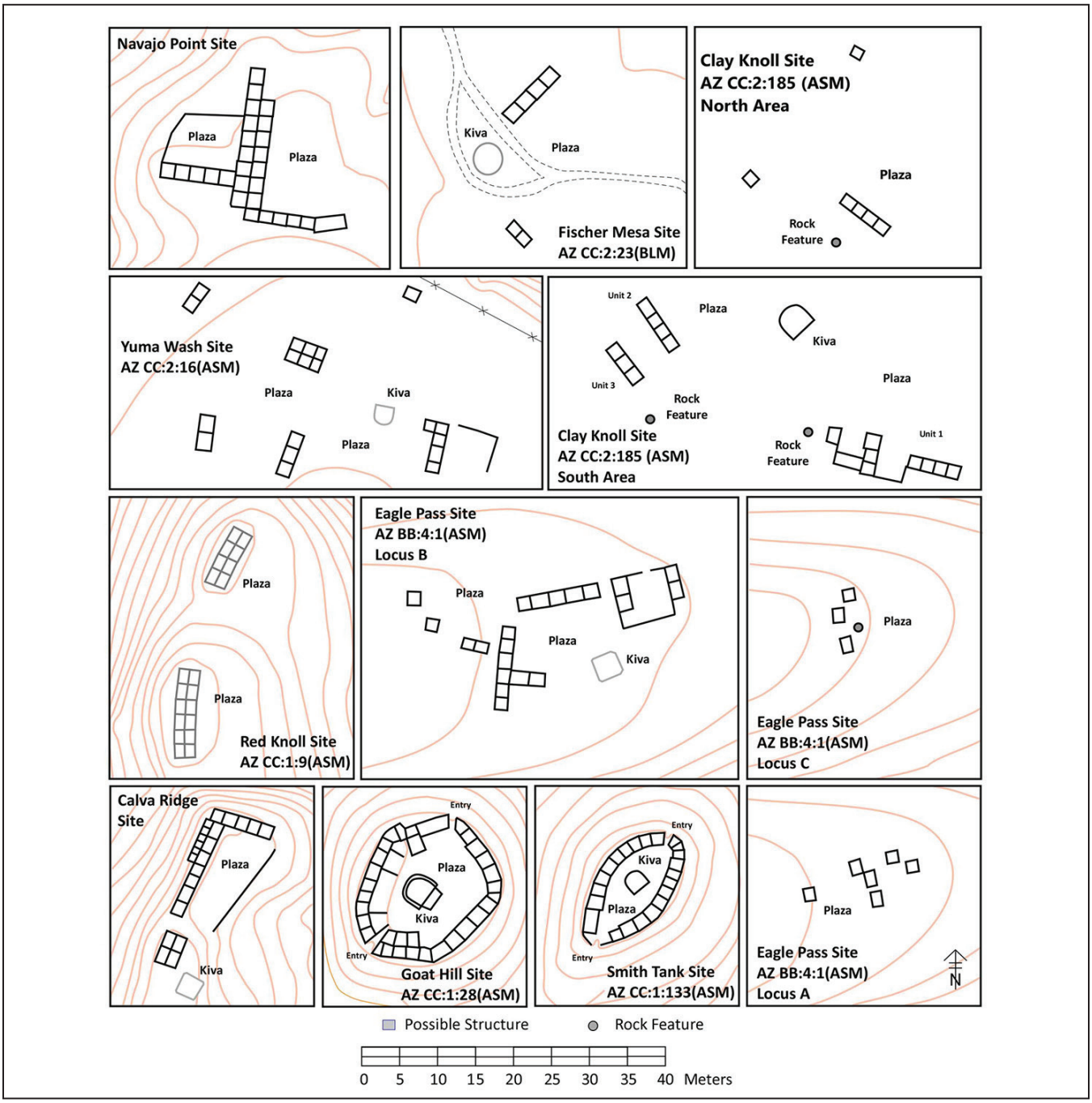


Figure 5. Examples of Goat Hill phase site structure.

poorly plastered or compacted floor areas. The single exception was a large rectangular structure, with around 20 m^2 of floor area, which possibly functioned as a communal room at the northern end of the plaza. Abutment patterns and entry placement indicate the organization of some structures as suites of two-to-three rooms with various functions, although others served as individual habitation rooms. Of the excavated rooms, several had internal features that included rectangular slab- or clay-lined subrectangular hearths with deflectors, and rectangular or L-shaped entry boxes, as well as wall or roof entries and raised exterior adobe steps (Woodson 1995, 1999). Dean's (1969) study of abutment patterns of Tsegi phase room suites found at the Betatakin, Kiet Siel, Batwoman House, and Scaffold House ruins provides examples that are analogous to those documented at the Goat Hill site (Figure 6).

However, one of the most striking features of the Goat Hill site is a D-shaped kiva that is approximately 8 × 7 m (56 m^2) (Figure 7). This semisubterranean structure was excavated about 1.8 m into the top of Goat Hill near the crest, between the room blocks, and centered on the plaza. The kiva included a southeast-oriented ventilator shaft centered on a rectangular altar area. The ventilator shaft was aligned with a deflector, a circular hearth, and an oval bowl-shaped sipapu centered within a D-shaped floor area with three linear loom anchor alignments. The adobe plastered floor was also bound by a 70-cm-diameter, 82-cm-high, semicircular bench. Although the upper portions were heavily eroded after being exposed to the elements, the kiva walls above and below the bench, including the altar area, were also plastered with adobe. Although burned and very poorly preserved, the kiva was also covered with a substantial timber roof supported by a four-post system. Thus, access to the kiva was gained by way of a ladder that extended from a roof entry hatch centered over the hearth. Although this morphological review of the Goat Hill kiva is not a revision, it lists several important structural features not previously mentioned diagnostic traits.

Mortuary Patterns

Another important trait not previously addressed is the Goat Hill phase mortuary pattern. No mortuary features were identified at the Goat Hill site and few contemporary, suggested Kayenta enclave sites in southeastern Arizona have excavated mortuary features, with the notable exception being the Davis Ranch site (Gerald 2019), where flexed inhumation was the predominant burial practice. Flexed inhumation was also the predominant mode of interment in the Kayenta area prior to depopulation (Haas and Creamer 1993; Stanislawski 1963). Nevertheless, Tatman (Tyberg 2000) and the Millses (1978) excavated mortuary features associated directly or indirectly with decorated Maverick Mountain pottery at the Buena Vista Ruin. Some of these mortuary features came from subfloor proveniences. No evidence of subfloor mortuary features was found at

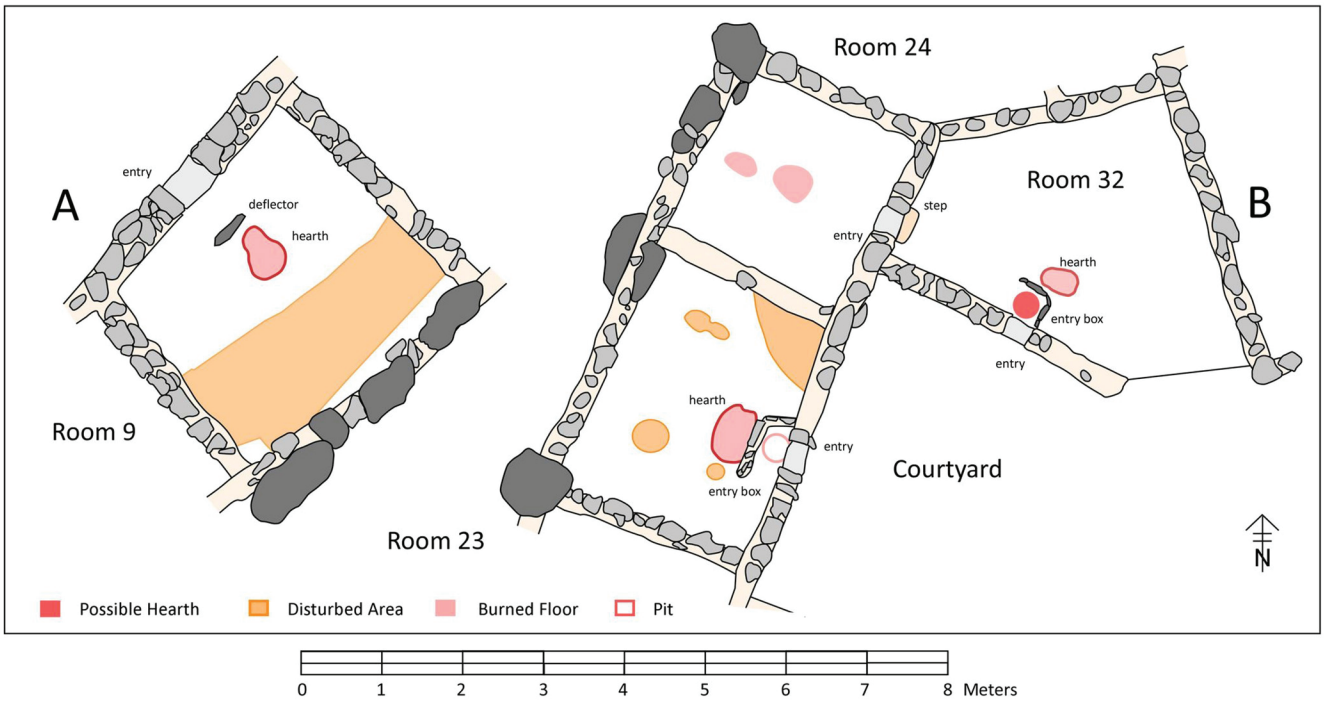


Figure 6. Examples of the entry box and deflector at the Goat Hill site. A) a deflector in Room 9; B) entry boxes in Rooms 23 and 32 (adapted from Woodson 1995).

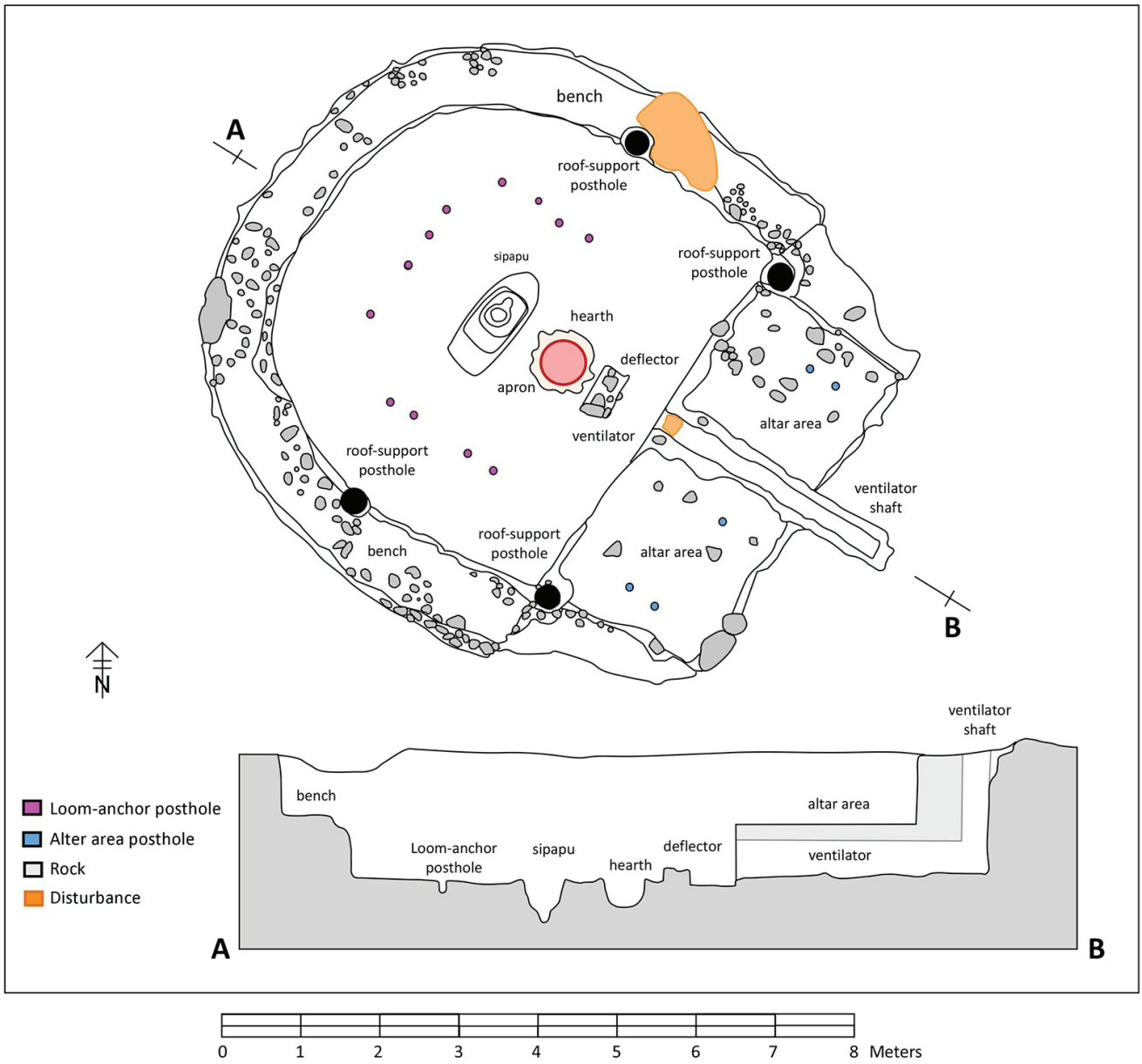


Figure 7. A plan map of the D-shaped kiva at the Goat Hill site (adapted from Woodson 1995).

AZ V:11:28(ARS), AZ V:16:8(ASM), AZ V:16:10(ASM), AZ CC:1:19(ASM), AZ CC:1:9(ASM), and AZ CC:2:53(ASM) (see Figure 1); all are sites with little-to-no Maverick Mountain pottery. Therefore, at the Buena Vista Ruin, we assume based on the published ceramic data (Mills and Mills 1978) that the subfloor mortuary features found within locales abandoned before the widespread use of Salado polychrome were associated with the Goat Hill phase. This included several subfloor infant remains that were not directly associated with Maverick Mountain pottery and were recovered within the Millses Houses I and IV, as well as a formal cremation cemetery.

Of these mortuary features, 29 appear to be associated with a Goat Hill phase occupation, of which 13 are subfloor infants and two extend supine adult inhumations, as well as two infant, two juvenile, and 10 adult secondary cremations. Furthermore, of these only five, or 17%, included corrugated vessels (Mills and Mills 1978). Finally, several subfloor infant mortuary features were found in rooms that had been abandoned and burned before, or upon the advent of Maverick Mountain pottery. Although these were also not directly associated with Maverick Mountain pottery, one bowl fragment was found within an upper-story room. This suggests the practice of subfloor infant burial narrowly preceded the advent of the Maverick Mountain Series

within the SCSA (Woodson et al. 1999).

Chronology

Woodson (1995) recovered sixteen tree-ring samples from the kiva and a room at the Goat Hill site and submitted them to the University of Arizona Laboratory of Tree-Ring Research. However, none of the samples were datable due to the small number of rings present and the absence of a concise local master tree-ring chronology. Four radiocarbon and four archaeomagnetic specimens were also recovered; however, all of these specimens lacked the precision required to properly date the very narrow timeframe the Goat Hill phase appears to occupy (Woodson 1999). Consequently, we base the chronology for our proposed revision of the Goat Hill phase primarily on cross-referenced, tree-ring dated decorated pottery types (Table 3). We also employ the seriation and sequencing of sherd count data recovered from sites scattered throughout the SCSA to refine our chronology.

Based on the date provided for the advent of Maverick Black-on-red and Maverick Polychrome at Point of Pines, we assume the founding of the Goat Hill site occurred around AD 1280 after the advent of the Maverick Mountain Series by AD 1270. However, the near absence of type diversity found within the Goat Hill decorated pottery assemblage makes it difficult to determine how long the site was occupied and when occupation ceased. For example, the ceramic assemblage is composed nearly solely of decorated Maverick Mountain (97.2%) and Salado polychrome (1.1% with 13 Gila Polychrome, 6 Pinto Polychrome sherds). Woodson (1999) remarked that the sparsity of midden deposits along the upper slope of Goat Hill and within most of the excavated structures, as well as minimal evidence for architectural remodeling, suggests that the site was not occupied for an extended period. It is also possible that the Goat Hill site was abandoned, and the Salado pottery is associated

Table 3. Dates for Decorated Ceramic Types for Goat Hill phase Based on Tree-ring Analysis

Series	Type	Initial Use	Terminal Use	Reference
Hohokam Ware	Casa Grande Red-on-buff	AD 1150	NA	Heckman et al. 2000; Wallace 2004
	San Carlos Red-on-brown	AD 1150	NA	Heckman et al. 2000; Wallace 2004
Cibola White Ware	Snowflake Black-on-white	AD 1175*	AD 1300*	Wood 1987; Zedeño 1994
	Reserve Black-on-white	AD 1050*	AD 1300*	Carlson 1970; Wood 1987; Zedeño 1994
	Tularosa Black-on-white	AD 1200*	AD 1300*	Rinaldo and Bluhm 1956
	Pinedale Black-on-white	AD 1275*	AD 1325*	Wood 1987; Zedeño 1994
White Mountain Red Ware	St. Johns Black-on-red and Polychrome	AD 1200*	AD 1300*	Carlson 1970
	Pinedale Black-on-red and Polychrome	AD 1275*	AD 1325*	Carlson 1970
Zuni Glaze Ware	Heshotauthla Black-on-red and Polychrome	AD 1275*	NA	Carlson 1970; Woodbury and Woodbury 1966
	Kwakina Polychrome	AD 1280*	NA	Carlson 1970; Woodbury and Woodbury 1966
Salado Polychrome	Maverick Mountain Black-on-red and Polychrome at Point of Pines	AD 1275*	AD 1300*	Breternitz 1966; Haury 1958; Lindsay 1987
	Tucson Black-on-red and Polychrome	AD 1275*	AD 1325	Dean 1996; Wood 1987
	Nantack Polychrome	AD 1275*	AD 1325	Neuzil and Lyons 2005
	Pinto Black-on-red and Polychrome	AD 1275*	AD 1325	Crown 1994; Reid et al. 1992
	Gila Black-on-red and Polychrome	AD 1295*	NA	Dean and Ravesloot 1993

with a later, short-term reuse of a few rooms.

Furthermore, our seriation of the sherd counts from the Buena Vista and Spear Ranch ruins indicates that upon the advent of Salado polychrome in the SCSA, the use of Maverick Mountain rapidly declined. This matches a similar trend identified for the Lower San Pedro area by Clark and Lyons (2012), which they interpret to represent a shift from Maverick Mountain as a Kayenta marker to Salado polychrome as an inclusive, integrative marker (Clark et al. 2013). For example, Pinto Polychrome is the earliest Salado polychrome and dates as early as AD 1275 at the Chodistaas site in the Ancha Cibecue area (Reid et al. 1992). However, Pinto Polychrome is rarely found in the SCSA in contrast to the far more common Gila Polychrome, the advent of which dates as early as AD 1295 based on Dean and Ravesloot's (1993) exhaustive study. Collectively, these data suggest that the Goat Hill site was occupied for no more than 15 to 20 years, between AD 1280 and 1300. Nevertheless, the sherd counts from the Buena Vista and Spear Ranch ruins indicate the Goat Hill phase continued another decade after the Goat Hill site occupation ended. Therefore, we provide a restricted date range between AD 1280 and 1310 for the Goat Hill phase; although it is possible the Goat Hill phase may have extended as late as AD 1325 (Table 4).

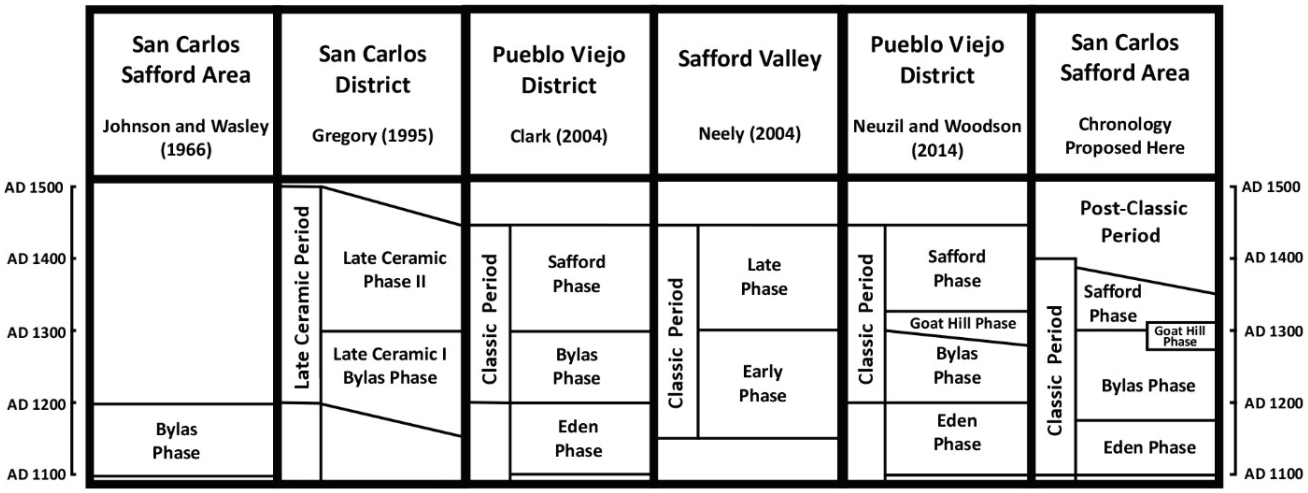
DISCUSSION

With the results for our revision of the Goat Hill phase, we discuss several associated topics and provide comparisons of thirteenth-century Western Ancestral Pueblo decorated ceramics to Maverick Mountain pottery. Our discussion also addresses the significance of Kayenta-Tusayan corrugated pottery using ceramic data and contrasts these data with the use of corrugated pottery at sites associated with the Goat Hill phase. The Goat Hill phase residential and ritual architecture is correlated with Ancestral Pueblo examples and comparisons are also made with perforated plates from the Kayenta area and those from the Goat Hill site. We also compare late thirteenth-century Ancestral Pueblo mortuary patterns with those associated with the Goat Hill phase. Finally, to explore the nature of the Kayenta migration, the Maverick Mountain Complex, and the Goat Hill phase room count estimates associated with the various late prehispanic Western Ancestral Pueblo, Northwestern Mogollon, and Southeastern Arizona archaeological areas are used.

The Technical Aspects of Maverick Mountain Pottery

In this section we detail the technical aspects of Maverick Mountain pottery as its production and similarities to other types are relevant to our assessment of Kayenta migration models and the Goat Hill phase. Although Lyons (2003) noted several similarities in design and style among Tsegi Orange Ware and the Maverick Mountain series, many differences are also apparent. For example, the exterior bottom of Tsegi Orange Ware vessels was typically unslipped, but, where present, the slip is orange or orangish-red. In contrast, the entire surfaces of Maverick Mountain bowls and the exterior surface of jars were nearly always slipped red or orangish-red. The use of small-looped handles on Kiet Siel Polychrome jars and bowls are mentioned (Lyons 2014:Figures 2, 3), and yet, this device appears to be far more common on Kayenta and Tusayan Polychrome bowls. However, these features are absent on Maverick Mountain and Tucson Black-on-red or Polychrome, as well as Nantack Polychrome. Another difference is that the temper of Tsegi Orange Ware consisted of a mix of sand, crushed sandstone, and/or crushed Tusayan White Ware sherds, whereas Maverick Mountain and

Table 4. Previous SCSA Chronologies Compared to our Proposed Revision of the Goat Hill Phase and SCSA Chronology



Tucson Black-on-red and Polychrome recovered at Goat Hill were tempered with arkosic sands. Lyons and Lindsay (2006:24) attribute the difference in tempering material to resource availability and the geology of the SCSA. Although the geologic-based temper differences due to local availability seem reasonable, the absence of sherd temper is not addressed. Ethnographic accounts indicate that the use of sherd temper holds symbolic significance that transcends structural characteristics or production methodologies (Barley 1994; Gosselain 1999; Kelly et al. 2011; Smith 1989; Woodward 2002).

There are at least three major variants of Maverick Mountain and Tucson Black-on-red and Polychrome. The first was predominantly found in the San Carlos Safford, Aravaipa Sulphur Springs, and Lower San Pedro areas (Brown 1973). Recovered from the argillic horizon, the paste of this variant is composed of a common alluvial clay. Due to the predominant granitic geology of the SCSA basin, this clay has a high organic content, with fine arkosic materials, as well as lignin and humic acids. Likewise, the temper was typically composed of poorly sorted yet fine grain arkosic sands that included quartz, feldspar, and mica (Brown 1973:107). In the SCSA, the red slip is composed of a dull red-firing clay. However, in the southern portion of the Aravaipa Sulphur Springs area, the slip tends to be composed of a thin hematite wash (Brown 1973; Neuzil 2005, 2008). Additionally, in the San Carlos Safford, Aravaipa Sulphur Springs, and Lower San Pedro areas, replication experiments by Andy Ward (2020), and the general use of copper carbonate and manganese dioxide in black pigments for vessels fired in an oxidizing atmosphere, lead us to suggest the dull, black mineral pigment on Maverick Mountain series pottery was likely composed of copper carbonate and manganese dioxide-based paint mixed with a small amount of clay fixative. For the polychrome types, the thin white paint applied as a narrow trim was made of white-firing, possibly kaolin, clay (Ward 2020). Overall, both the slip and paints have a somewhat dull appearance.

The second variant was partially confined to the southern portion of the Natanes Forestdale area. Brown (1973:110) defines it as a paste composed of alluvial clays laced with coarse-grain Leucite tuff and hematite-stained biotite and a sand temper with intrusive volcanic material. Brown reported that Maverick Mountain Black-on-red sherds with this type of paste and temper were found at the Methodist Church site and that the sherds were indistinguishable from those found at the Point of Pines site. The paste of the third variant is similar but includes clays with fine-grain basalt and bits of glassy material (Brown 1973:109). This variant was found at sites in the Upper Gila River region, as well as the southeastern and eastern portions of the Natanes Forestdale area and SCSA, respectively. The slip and paints used on the second and third variants are similar to the first, however, they have a glossy, rather than dull or subdued appearance (Brown 1973; Neuzil and Woodson 2014).

Based on replication experiments Andy Ward (2020) performed using the available technology and resources, the process of firing Maverick Mountain pottery is rapid yet complex. Lasting only about an hour, it involves a three-stage process that begins with the initial ignition and consumption of oxygen and computable fuel that quickly produce the heat required for ceramification and the gasses associated with a reducing atmosphere. In the second stage, the heat reaches a sustained peak temperature as the fuel reduces to charcoal and oxygen is reintroduced due to changes in air pressure. At this point, the residual water content is driven out and internal organic material carbonizes as the clay becomes rigid and only slightly ceramified. At the same time, the iron- or manganese-rich clay slip and paint fires red and black, respectively, in an oxidizing atmosphere. With a reduced temperature and a neutral atmosphere, the third stage represents a slow drawn-out cooling down phase. Unfortunately, replication experiments of the firing process for Tsegi or Winslow Orange Wares are yet unavailable. However, the use of an orange firing slip and the common presence of internal carbon streaking (Colton and Hargrave 1937; Colton 1956) suggest the firing process of Tsegi and Winslow Orange Ware was similar to that used to produce Maverick Mountain pottery. In summary, Maverick Mountain series pottery found on sites in the SCSA were locally produced or transported from the Point of Pines area.

The Sherd Count Data

Our initial seriation and sequencing of sherd count data determined that several notable changes in the constellation and volume of decorated pottery characterize the Goat Hill phase assemblage when compared to the preceding Bylas phase. The source sherd count data for the following seriation and sequencing was derived from Johnson and Wasley (1966), Brown (1973), Rule (1993), Rinker (1998), Jones and Montgomery (2013), Lascaux et al. (2019), Woodson (1995), Mills and Mills (1978), and Neuzil (2005). Overall, these changes represent a radical and relatively rapid shift from the production of local types and the large-scale procurement of intrusive types to the near-exclusive local manufacture of types associated with an intrusive tradition. The seriation and sequence of the Late Formative and Early Classic period sherd count data from SCSA sites demonstrate a consistent pattern (Figure 8). With minor shifts over time, this pattern consists of assemblages dominated by the local production of decorated Hohokam Buff Ware and

Southern Mogollon Brown Ware. This was augmented by the procurement of large quantities of Cibola White Ware and White Mountain Red Ware, as well as lesser amounts of El Paso Polychrome and Tanque Verde Red-on-brown.

Upon the advent of Maverick Mountain decorated types, the SCSA sherd count data indicate the local adoption of Maverick Mountain was not entirely uniform. For example, at the Methodist Church site, the early and late samples show that although the share of locally made decorated pottery decreased, the volume of its production remained relatively consistent (see Brown 1973). This indicates that local decorated ceramic production associated with communities of Bylas and Goat Hill phases overlap chronologically. At the Fischer Mesa and Yuma Wash sites, minimal locally produced decorated pottery occurred alongside Maverick Mountain pottery. Instead, 25% and 75% of the decorated types at the Fischer Mesa and Yuma Wash sites were composed of White Mountain Red Ware, respectively. Although primarily typed as St. Johns Black-on-red and St. Johns Polychrome at both sites, upon closer inspection the vast majority appear to represent a variant of Maverick Mountain Black-on-red and Maverick Mountain Polychrome with the style of decoration similar to Tuwiuca Polychrome, which is found primarily as bowls with an exterior white design reminiscent of St. Johns Polychrome.

In contrast, the amount of Maverick Mountain pottery found in the Millses (1978) Houses 1 and 4 at the Buena Vista Ruin is similar to that found at the

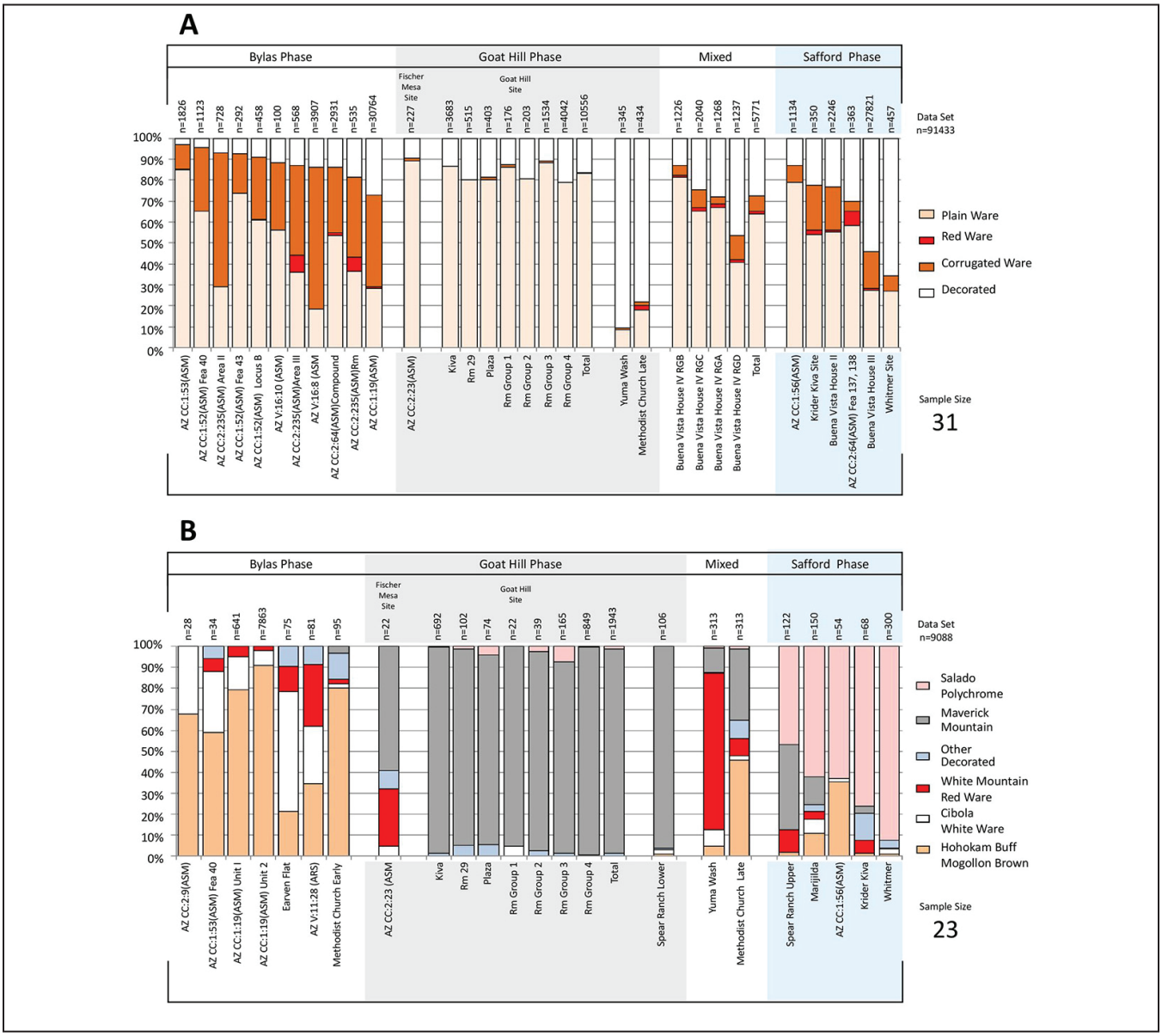


Figure 8. Sequenced seriated Late Formative and Classic periods sherd count data used to define the Goat Hill phase. A) overall ceramic assemblage; and B) decorated pottery assemblage.

Methodist Church site (see Figure 8). However, the sequenced sherd counts indicate that as the amount of Maverick Mountain pottery increased, the frequency of Casa Grande Red-on-buff and San Carlos Red-on-brown decreased. The Buena Vista data also indicate a corresponding decrease of Cibola White Ware, White Mountain Red Ware, and Zuni Glaze Ware pottery. Although El Paso Polychrome and Chupadero Black-on-white are present in small amounts, it is unclear if they were primarily procured before or during the Goat Hill phase. Moreover, it is unclear if the procurement of these types changed during the Goat Hill phase.

Finally, the seriated sherd counts from the Spear Ranch Ruin and the Goat Hill site provide the most robust examples of ceramic assemblages associated with the Goat Hill phase. These sites offer the starkest contrast within the mélange of pottery types associated with the Bylas and Goat Hill phases. The early Spear Ranch and Goat Hill samples showcase ceramic assemblages with very low diversity. At the Spear Ranch Ruin, 97% of the decorated pottery were Maverick Mountain types. Similarly, at the Goat Hill site, Maverick Mountain types composed 98% of the decorated ceramic assemblage. In both cases, the remaining respective 2-3% represent pottery associated with Formative and Early Classic period occupations. We infer the lack of diversity at the Goat Hill site to be the result of its founding on a relatively isolated hilltop that had not previously been occupied. However, the Spear Ranch Ruin appears to have had a continuous settlement from the Formative through the Late Classic period, suggesting that not all Goat Hill phase sites experienced similar forms of conflict with local Hohokam and Mogollon communities. Fortunately, for our study, Brown's (1973) test trench must have been placed within a midden deposit created primarily during the late thirteenth-century.

Corrugated Pottery

Fully corrugated pottery became a common Western Ancestral Pueblo ceramic type shortly after it was introduced in the early eleventh century (Pierce 1999:81), and its use rapidly spread throughout the Tusayan and Kayenta areas, although it readily appears in the Mogollon area in the ninth century with Mimbres Fully Corrugated (McCollum 1992). Our cursory analysis based on available sherd count and tree-ring dated sites finds that by the early twelfth century at least six distinct groups, defined by the use of corrugated pottery, had formed. Figure 9 depicts the geographic archaeological areas where the various Kayenta, Tusayan, and Middle Little Colorado area sites employed in this analysis are located, and Figure 10 provides the results for the seriated and sequenced sherd count analysis. The source data for this analysis come from Adams (2001), Ambler (1985a), Di Peso (1958), Gerald (2019), Haas and Creamer (1993), Neuzil (2005), Smith (1972), and Stone (2020). In the Tusayan area, centered on the Hopi Mesas District, corrugated pottery typically composed between 40% and 70% of an assemblage. For the majority of the Kayenta area, the volume of corrugated pottery was similar, typically between 50% to 80% of a given assemblage. However, there were also four outlier groups; notably, one with less than 5% corrugated in the area around the Kin Klethla Ruin. Another group was situated near the Black Mesa District with 70% corrugated, 30% decorated, and almost no plain wares. A group in the Shonto Plateau and Tsegi Canyon districts had about 45% corrugated with around 5% plain ware, whereas still another group of sites in the Navajo Mountain District had nearly 70% corrugated and very little plain pottery. The ceramic assemblage of the final group of sites situated north of Navajo Mountain had 65% to 70% plain ware with less than 5% corrugated pottery.

However, with widespread depopulations initiating around AD 1130, and the formation of new communities after AD 1150 (Ambler 1985b), the distribution of sites northeast of the Tusayan area with assemblages dominated by corrugated pottery in the Kayenta area appears to have shrunk to the area around Betatakin Ruin and Klethla Valley. Correspondingly, the number of sites with between 10% and 30% corrugated seem to have advanced south and southeast, from the Navajo Mountain District to extending as far as the area around Kiet Siel Ruin and the Long House Canyon District (Ambler 1985b). These territorial shifts and readjustment of sites associated with particular amounts of corrugated pottery seem to correspond to the localized abandonment of small settlements and the trend towards increased aggregation and larger communities (Ambler 1985b; Dean 1969, 1996; Dean et al. 1978). Overall, this general process appears to have been contemporary with the general depopulation of the Black Mesa District. Based on extensive archaeological surveys and excavations in the Kayenta Valley, Long House Canyon, Tsegi Canyon, and Klethla Valley districts, Haas and Creamer (1993) provide evidence for increased warfare and propose the development of interaction networks. We add that the geographic grouping of contemporary sites with similar ceramic assemblages certainly reflects localized exchange and implies the development of interaction networks and ethnopolitical identities.

Our cursory analysis of the ceramic assemblage associated with the Maverick Mountain component at Point of Pines Ruin in the Natanes Forestdale area focused on the D-shaped kiva. From the kiva floor fill, plain ware made up 22% of the assemblage. Whereas,

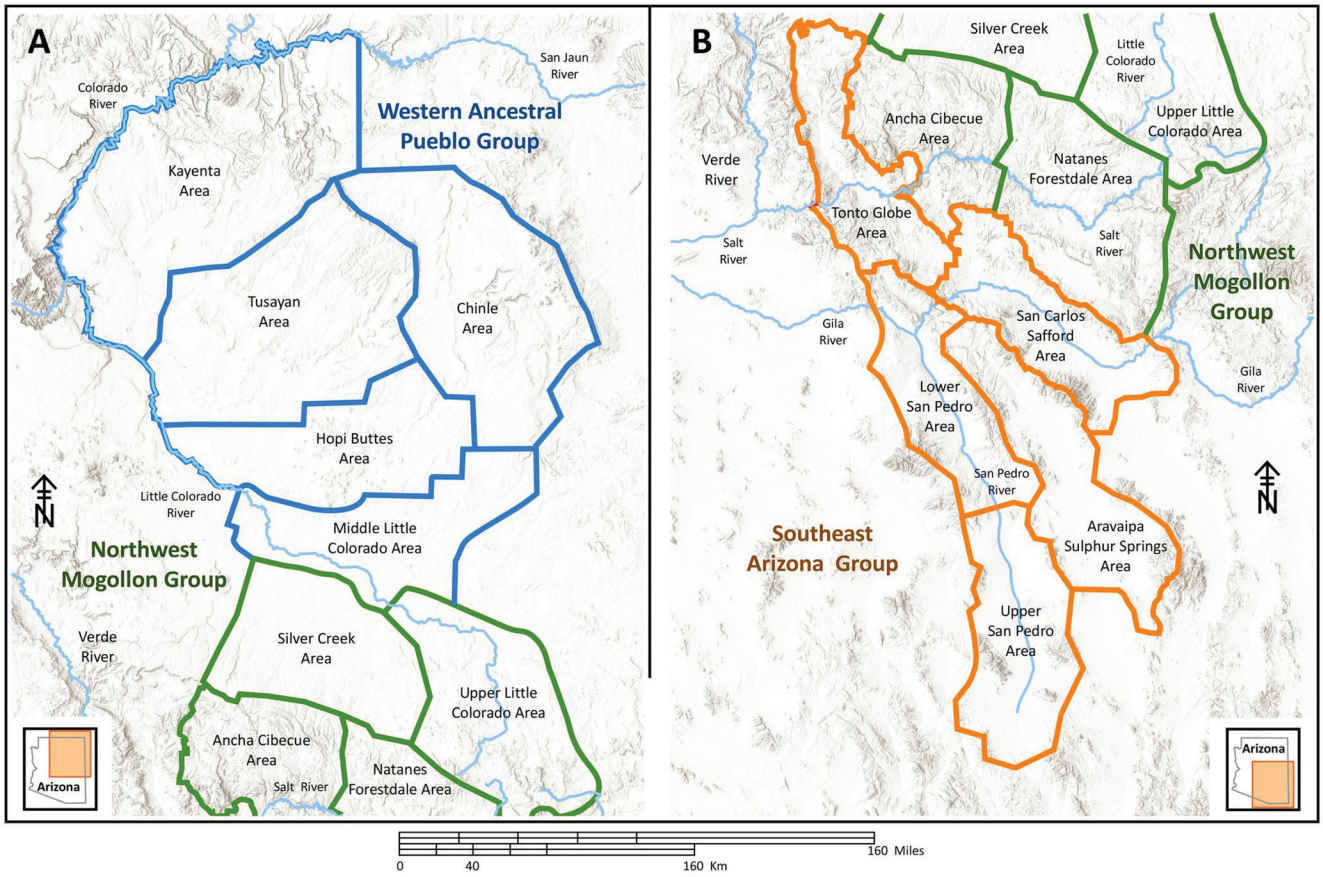


Figure 9. Maps with the various geographic archaeological areas used in this study as analytical units. A) Western Ancestral Pueblo Group and Western Mogollon Group of Archaeological areas; B) Western Mogollon group and southeast Arizona group of archaeological areas.

the corrugated and decorated represented 40% and 38% of the pottery, respectively (Stone 2020:Table 2.9). Welch (1995) indicated that at the Pueblo Devol cliff dwelling in the Bonita Creek District, Maverick Mountain and Salado polychrome predominated. He also reported that corrugated pottery was more numerous than plain ware. Unfortunately, Welch's publication does not include the exact ceramic data and thus we are unable to precisely compare the Maverick Mountain component at the Point of Pines sample with the Pueblo Devol ceramic assemblage. Nevertheless, as Welch (1995:136) insisted that corrugated pottery was well represented, we may assume the two assemblages are similar. In turn, this suggests the composition of ceramic assemblages associated with Maverick Mountain components at sites in the Point of Pines and Bonita Creek districts were similar to those found in the Kayenta and Tusayan areas.

As outlined above, the amount of corrugated pottery was consistently very low at sites associated with significantly high levels of Maverick Mountain decorated types in the SCSA. These included the Goat Hill, Yuma Wash, Methodist Church, and Mesa sites, as well as Millses's House 4 at the Buena Vista Ruin. Thus, the mixture of basic ceramic ware types found at these sites is rather uniform. Yet, this collective mixture of pottery types is dissimilar to that associated with Bylas phase sites, the Maverick Mountain component in the Point of Pines and Bonita Creek districts, and contemporary sites scattered throughout the Kayenta and Tusayan areas. Finally, because of their association with Maverick Mountain decorated pottery, we extended our study to the Reeve and Davis Ranch ruins. With 20% to 25% decorated and 69% to 70% plain ware, the seriation of ceramic ware types at these sites in the Lower San Pedro area was nearly identical to the Goat Hill site sample with 1.3% and 0.3% corrugated, respectively. Furthermore, these Lower San Pedro area ceramic ware type seriations were otherwise very similar to those associated with Maverick Mountain in the SCSA (see Figure 10). We suggest the lack of corrugated pottery at Goat Hill phase sites indicates that local potters lacked experience in the production of corrugated pottery or came from a population with few potters experienced

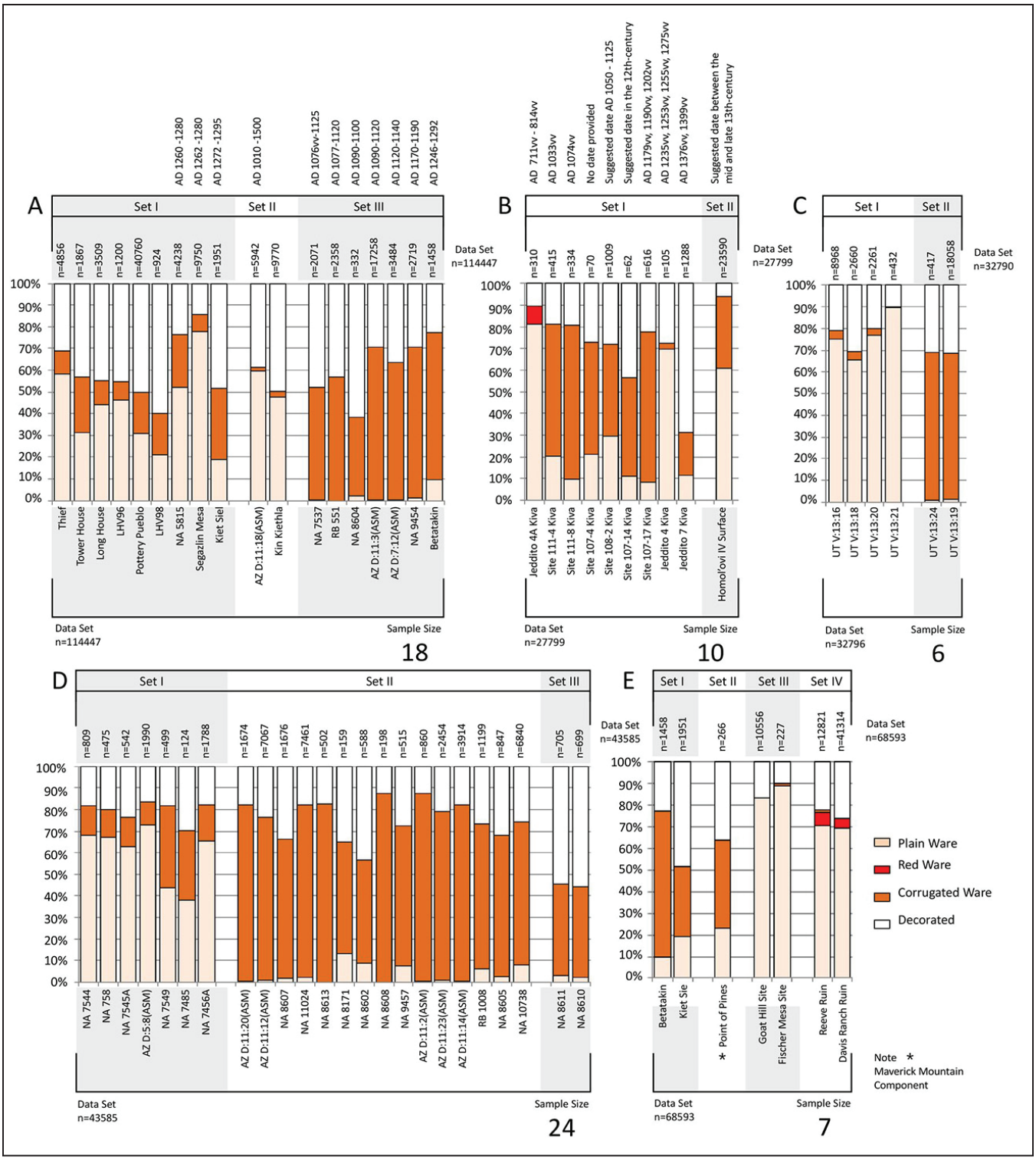


Figure 10. Results of the seriated and sequenced sherd count analysis. A) Cross-dated sample from the Kayenta area; B) Tree-ring dated samples from the Antelope Mesa District in the Tusayan area and Middle Little Colorado area; C) Samples from sites within the Kayenta area north of Navajo Mountain; D) Samples from twelfth- and thirteenth-century sites in the Kayenta area; E) Comparison of samples from sites located in the Kayenta, San Carlos Safford, and Lower San Pedro areas.

in the production of corrugated pottery, as opposed to Mogollon groups that migrated into southeastern Arizona in the twelfth century (Clark and Lengyel 2002).

Perforated Plates

Lyons and Lindsay (2006:13) indirectly cited Alexander Lindsey as the source for claims of a perforated plate that was recovered from a Basketmaker III pit house within an undisclosed site in the Laguna Creek District east of Kayenta. As the use of pit house architecture continued throughout the Kayenta area into the thirteenth century, we question the context of this find and date assigned by Lindsay but lacking additional data we cannot outright preclude it. Further, Christenson (1994) and Anderson (1969) provide the earliest documented references for perforated plates in the northern Black Mesa and Shonto Plateau districts where their use became common by the twelfth century. By the early thirteenth century, the use of perforated plates extended from the Paiute Mesa in southern Utah to the Klethla Valley in the Kayenta area and as far east as Canyon de Chelly (Lyons 2003).

However, before AD 1250, perforated plates were commonly associated with decorated Tsegi Orange Ware and general corrugated pottery (Anderson 1969; Lindsay 1967), and the area of their greatest concentration seems centered on Tsegi Canyon, Long House Valley, and Klethla Valley. With the depopulation of the Kayenta area by AD 1300, perforated plates are found at numerous sites within a large arc that extends from the Tusayan area south to the Phoenix Basin, Tucson, San Pedro, San Simon, and Upper Gila River areas, as well as far south as Paquimé in northwestern Chihuahua. Clark (2001) and Lyons (2003) use this fourteenth-century distribution pattern in support of their Kayenta migration narrative. Yet, the recovery of perforated plates at sites on Antelope Mesa (Fewkes 1898) associated with Tsegi Orange Ware, at Homol'ovi IV (Lyons 2001) and the Bailey Ruin (Kaldahl et al. 2004; Mills 1998) with Tsegi and Winslow Orange Ware, as well as their presence at Point of Pines Ruin (Lindsay 1987), Goat Hill site (Woodson 1995), and Davis Ranch site (Gerald 2019) associated with Maverick Mountain pottery are of particular interest to our study as many archaeologists relate perforated, and non-perforated plate examples, with movement of Kayenta groups into these sites.

Favoring a utilitarian function, Lyons (2003) and Lyons and Lindsay (2006) discussed the use of perforated plates. Citing numerous references, Lyons argued that this artifact type served as a rudimentary potter's wheel designed to support and help shape in the construction of a vessel. This interpretation was based primarily on the presence of complete perforated plates associated with definitive pottery-making tools within several mortuary features at a Tsegi phase Kayenta site in the Rainbow Bridge area (Crotty 1983). This view was further promoted by occasional turning abrasions centered on the plate bottom, as well as traces of unfired tempered clay and smudges of red paint on the exterior and interior surfaces on a small number of perforated plates and associated sherds (Lyons 2003). Finally, Lyons stressed the utilitarian use for perforated plates due to the ubiquitous and rather domestic nature of their context, as well as the presence of traces of red fingerprints found on some that support the production of red ware pottery using these plates (Lyons 2003).

In support of an alternative, additional interpretation for the role of perforated plates, we point out the recovery of ceramic plates lacking perforation in the same contexts as perforated plates (Lyons and Lindsay 2006:19–20) and draw attention to the general 'plate- or dish-like' nature of their design (Lyons and Lindsay 2006:8–10). We propose perforated plates were intentionally produced for a specific purpose, yet they were also employed in a wide range of unrelated activities, post hoc. We additionally suggest it is probable that perforated plates were employed both as pottery making tools and ceremonial plates. We draw attention to the plate or dish-like morphology, which is similar to examples made of basketry (Lyons and Lindsay 2006:10, 16). Underpinning our interpretation is the recovery of an intact perforated plate by Hargrave (1931) at Kokopnyama in the Jeddito Valley, where his Hopi field crew informed him that this device was used in an extinct ceremony in which flowers were inserted into the holes. This link between perforated plates and an extinct ceremony that involved flowers is supported by the recovery of a perforated plate within Sunflower Cave in northeastern Arizona where a cache of painted wooden ceremonial flowers and other ceremonial artifacts were found (Kidder and Guernsey 1919). Furthermore, Fewkes (1898:622) mentioned the presence of perforated plates in the Antelope Mesa District and described them as 'flat basins' or 'saucers.' He noted that the rim of these vessels was punctured by numerous holes. He then mentioned a spring where large numbers of perforated plate sherds were found nearby, and that these vessels were considered to have been used in ceremonies to hold ritual offerings of maize to appease an unspecified deity.

In further support of our inferred association between perforated plates and ceremonial practice, we note that Holmann et al. (1992) found two perforated plates near a possible kiva-like structure in Besh-bagowah in the Globe Uplands. They proposed these vessels were used in a ceremony in which the holes held

feathers. Dorsey and Voth (1901) similarly describe and depict the ceremonial use of shallow plates with feathers and cornmeal at Oraibi. As it applies to the possible ceremonial use of the perforated plate, the importance of Dorsey and Voth's observations is that they documented in detail the Soyal ceremony. This represents a Natalis Invicti/Yule/Christmas-like, or New Years' ceremony and is a central aspect of Hopi culture that occurs at the winter solstice. If indeed perforated plates were associated with incipient Soyal-like ceremonies, this implies the emergence or ethnogenesis of a proto-Hopi identity, and the significance of this cannot be understated. To reiterate, we do not preclude the utilitarian function discussed by Lyons and Lindsay (2006) and Lyons (2019); however, we do suggest that perforated plates held significant cultural value beyond being solely used in the production of pottery and that the use of perforated plates in a proto-Soyal ceremony was an integral practice undertaken by migrants at sites such as Goat Hill and Davis Ranch.

Residential and Ritual Architecture

Architectural traits identified at the Goat Hill site, such as groupings of small room blocks or interconnected room suites, have previously been associated with the Tsegi phase Kayenta tradition (Lyons 2003; Neuzil 2005). Yet, similar thirteenth-century architectural examples are found in the Tusayan area at Awat'ovi (Dennis Gilpin, personal communication 2019), Jeddito 4, 107, and 108 on Antelope Mesa (Smith 1972), and at a small Klethla phase site recorded by Mindeleff (1891) in the Moenkopi District (Figure 11). We identify other similar, contemporary examples at the initial Homol'ovi IV and Homol'ovi III ruins in the Middle Little Colorado area (Adams 2001, 2002), as well as Antelope House (Morris 1986) and Tse-Ta'a (Steen 1966) ruins in Canyon de Chelly. Parallels have also been drawn between the defensive character of the Goat Hill site and hilltop Tsegi phase sites in the Kayenta area (Haas and Creamer 1993; Neuzil 2005). But again, the structure of the Homol'ovi IV village situated on top of a steep butte is similar. Here access to the hilltop room block was gained by a narrow passage and a steep set of stairs built into the slope that provided entry through a double course wall segment situated at the top of the butte (Adams 2001). Although the site structure of Hockovi phase settlements on Antelope Mesa are not overtly defensive, steep slopes and cliffs restricted access and significantly enhanced security and passively served to deter aggression.

Use of the entry box complex at the Goat Hill site also has a strong Tsegi phase connection. However, typically only a few rooms employed this feature in the Kayenta area. Likewise, of the eleven rooms excavated at the Goat Hill site, the entry box complex was found only in adjacent rooms 23 and 32, whereas nondiagnostic defectors were found in rooms 1 and 8. Another distinction is apparent in the use of open space at the Goat Hill site compared to Tsegi phase Kayenta sites. At the Goat Hill site, there may have been two small courtyards, but the plaza was predominant. Although plazas are found at a few Kayenta sites, the use of small courtyards was far more common. Contrastingly, the plaza was relatively ubiquitous at sites in the Tusayan and Winslow areas. Based on these comparisons we question the prevailing, strong Kayenta connection that remains widely discussed and derived from the presumption of exclusive association between the design style of Maverick Mountain pottery and decorated Tsegi Orange Ware. Conversely, a far more complex, nuanced picture emerges with the potential mixture of architectural traits associated with the Goat Hill phase.

For instance, Woodson (1999) points out similarities in design between the D-shaped kiva found at the Goat Hill site and early to mid-thirteenth-century examples documented by Smith (1972) on Antelope Mesa in the Tusayan area. There the D-shaped kiva tradition seems to begin in the mid-eleventh century with incipient examples found in both the Antelope Mesa and Black Mesa districts (Gumerman 1970). The floor features found in the late thirteenth-century example at the Jeddito 4 site on Antelope Mesa had a circular hearth, deflector, sipapu, and alignments of loom anchor holes similar to those identified in the kiva at the Goat Hill site. But, notably, the Antelope Mesa D-shaped kivas do not have benches consistently. Overall, these distinctions stand in sharp contrast to the Eastern Ancestral Pueblo-inspired, Keyhole-shaped kivas found throughout the Kayenta (Stone 2012) and Chinle areas (Morris 1986). We do, however, acknowledge the existence of similarities between the bench, roof support system, as well as the type and placement of floor features found in the Tsegi phase Keyhole-shaped kiva at Neskahi Village in the Paiute Mesa District to these same features found within the Goat Hill site kiva, as well as the occurrence of rectangular kivas at Davis Ranch and the Safford phase Krider Kiva site, AZ CC:1:43(ASM) (Jernigan 1993).

Interestingly, several early, twelfth-century, D-shaped kivas are also documented north of Navajo Mountain in the Rainbow Plateau District of the Kayenta area at the Small Jar Pueblo and at UT V:13:19 (Geib et al. 1985). Although these kivas have similar four-post roof support systems, only the example at the Small Jar Pueblo had a sipapu, and none of the three kivas contained loom anchor holes. The missing loom anchor holes may be explained by the geographic setting and timing surrounding the spread of high altitude adapted

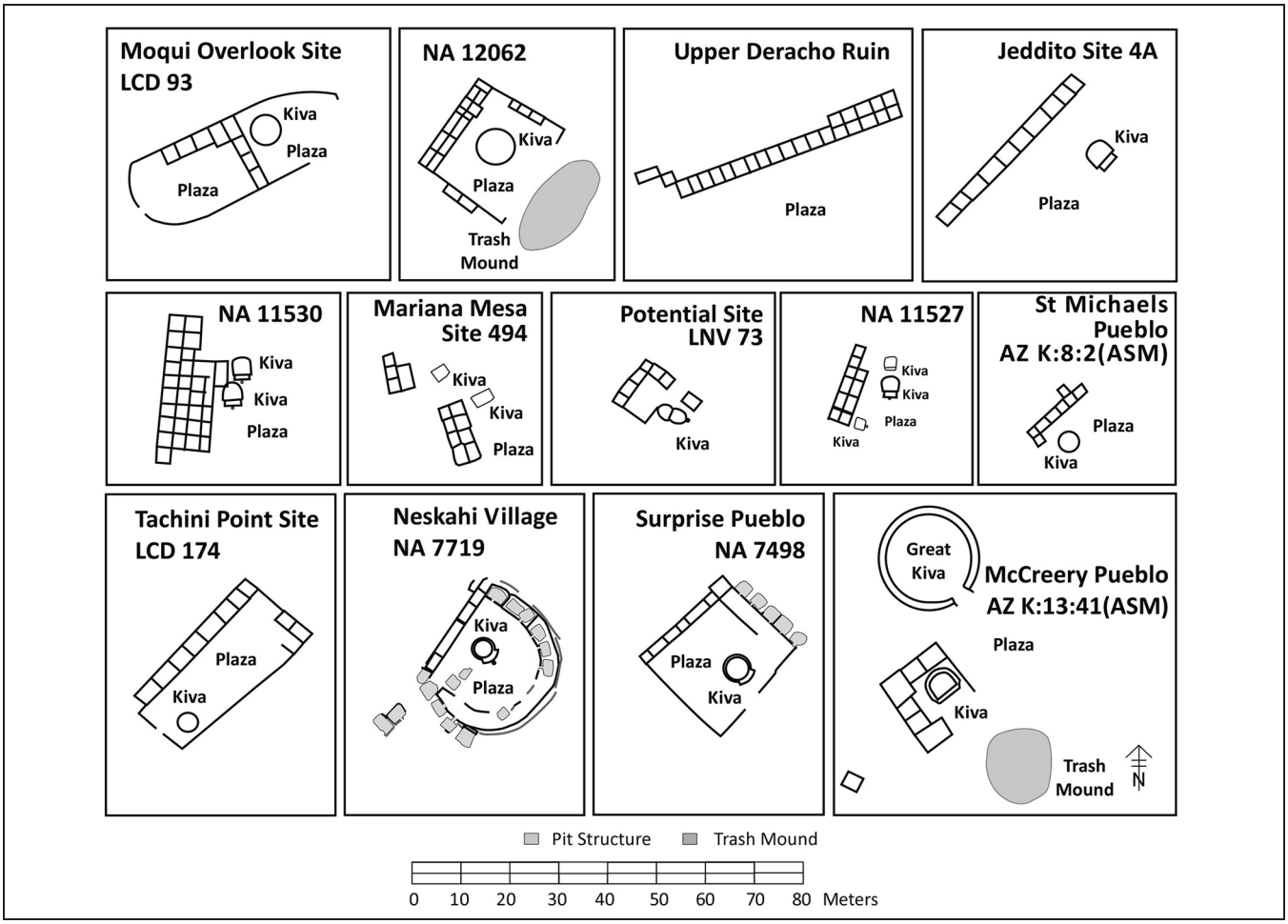


Figure 11. Examples of thirteenth-century Western Ancestral Pueblo site structure found in the Kayenta, Tusayan, Chinle, and Middle Little Colorado areas (adapted from Ambler et al. 1964; Andrews 1978; Burton 1993; Dean 1996; Haas and Creamer 1993; Hobler 1964; Kintigh 1985; Smith 1972; Varien 1990).

cotton to this latitude. This suggests that the practice of weaving had not achieved the status it secured in the Tsegi phase. We discuss attributes of kivas in nearby areas and provide plan maps of late eleventh- through thirteenth-century D-shaped found in the Kayenta, Tusayan, Silver Creek, and Zuni areas in Figure 12. We note that the kivas at UT V:13:19 and AZ D:11:11(ASM) in the Black Mesa District had benches, an attribute absent from Antelope Mesa examples. An early thirteenth-century, D-shaped kiva was also excavated at the Carter Ranch Pueblo in the Hay Hollow District of the Silver Creek area (Martin et al. 1964). Unlike the Antelope Mesa D-shaped kiva examples, this kiva had a bench and a five-point roof support system that used pilasters. Furthermore, a rectangular stone-lined hearth and a deflector were present, but a sipapu was absent. Finally, five sites excavated in the Zuni area also had a series of D-shaped kivas. One of these Roberts (1931) found at the Kiatuthlanna Ruin and two small incipient examples Roberts (1932) excavated at the Village of the Great Kivas Ruin. Five additional excavated D-shaped kivas found in the Zuni area were remarkably similar to the Goat Hill site and Carter Ranch Pueblo examples (Varien 1990). The earliest of these dates between the early-to the mid-eleventh century, whereas the latest examples date between AD 1250 to 1275 based on tree-rings. Although the floor features were similar to the Goat Hill site kiva, these kivas had four-point roof support systems that used pilasters. Consequently, it seems that beyond the morphological similarities found among Tusayan D-shaped kivas in the Antelope Mesa District, the mix of architectural traits associated with Kayenta, Zuni, and Silver Creek examples, and the Goat Hill phase kiva, necessitate a nuanced investigation in the future.

Mortuary Patterns

Characterized by flexed inhumation, the mortuary pattern in the Kayenta, Tusayan, and Chinle areas remained relatively consistent for at least thirteen centuries. Deceased individuals were typically interred in rock crevices, stone-lined cists, or shallow pits found

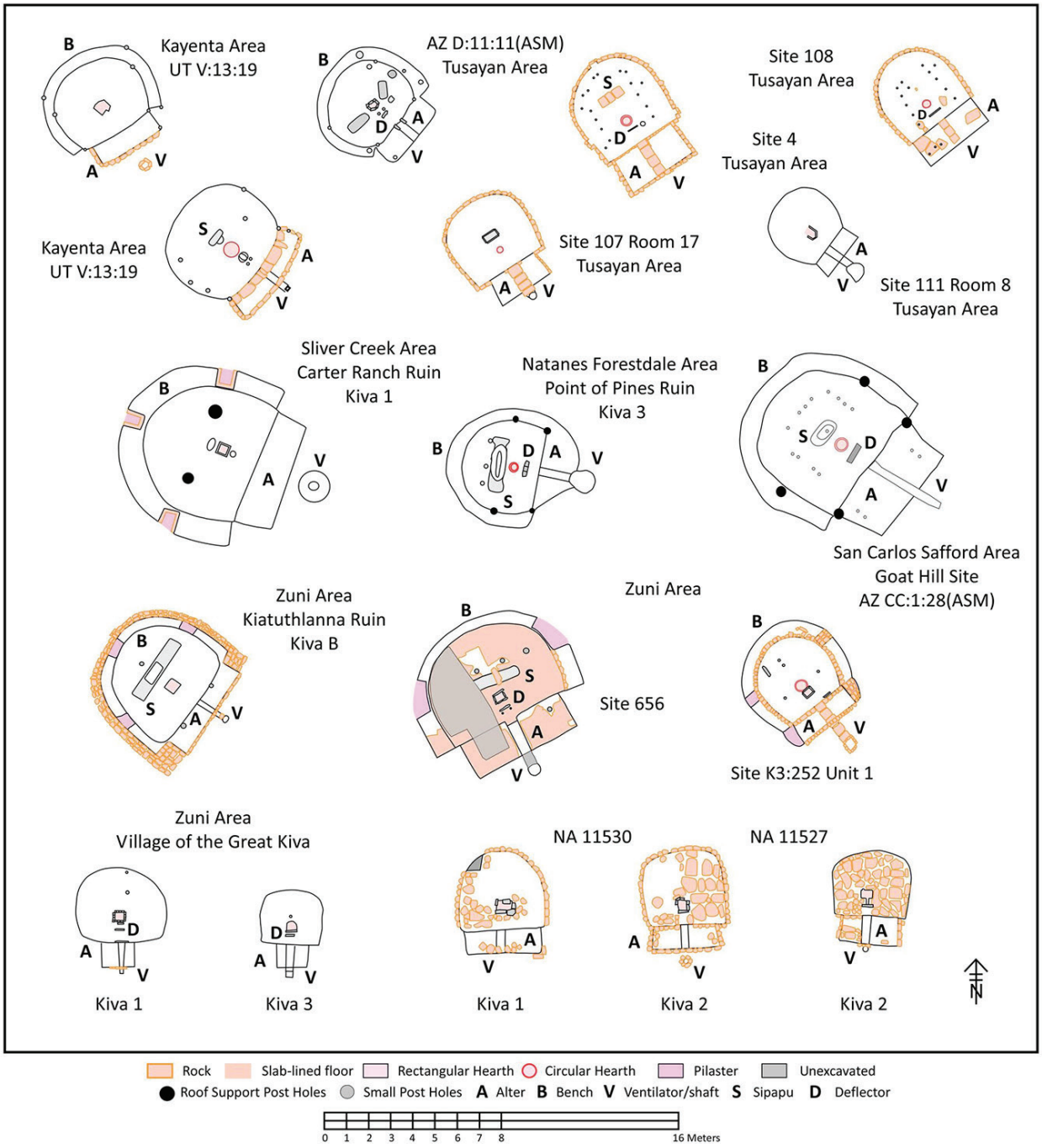


Figure 12. Examples of late eleventh- to thirteenth-century, D-shaped kiva from the Kayenta, Tusayan, Silver Creek, and Zuni areas (adapted from Geib et al. 1985; Gumerman 1970; Martin et al. 1964; Roberts 1931, 1932; Smith 1972; Stone 2020; Varien 1990).

in rock shelters, trash areas, and other abandoned features (Guernsey 1931; Guernsey and Kidder 1921; Kidder and Guernsey 1919; Martin et al. 1991; Steen 1966). Excavations of early mortuary features recovered a wide range of funerary artifacts that often included perishable material, such as blankets, sandals, basketry, cordage, and mats. However, by the Tsegi phase, small informal cemeteries that probably represented family units appeared, and although they vary from site to site, interred individuals are accompanied with a somewhat standard set of funerary offerings. These often included what may be interpreted as a ceramic culinary or serving set consisting of a jar, canteen, mug, and bowl, as well as a ladle, scoop, or spoon (Martin et al. 1991; Steen 1966). Some mortuary features also included functional items that suggest particular kinds of craft, industry, and ceremonial such as weaving, pottery making, or food processing. Although there are clear distinctions between individuals recovered in different districts, mortuary features within each site group bear little evidence of differentiation based on status or age. However, sex is one clear distinction identified in late Tsegi phase mortuary features. For example, at RB568 and Inscription House Ruin there was an abnormally high number of adult females compared to adult males represented in the mortuary population (Haas and Creamer 1993). Here the latter ranged from 33% to only 18% of the population, respectively.

As no human remains were recovered from the type site, our critique of Goat Hill phase mortuary pattern remains limited, although flexed individuals were recovered from excavations at Davis Ranch site in the Lower San Pedro area (Gerald 2019). However, several factors previously listed indicate that some of the mortuary features excavated by Tatman (Brown 1973; Tyberg 2000) and the Millses (1978) at the Buena Vista Ruin were associated with a Goat Hill phase occupation. These include the human remains recovered within the Millses Houses I and IV, as well as a formal cemetery located east of House I. This representative sample of 29 individuals reveals a distinct, differential treatment of the deceased based on age. Herein, the vast majority of juvenile and adult individuals were cremated and interred within a formal extramural cemetery associated with the Bylas phase occupation. In contrast, infants were interred as inhumations in shallow pits located below the floors of habitation rooms.

Therefore, except for the decorated pottery types previously discussed, intermingling of juvenile and adult populations result in an otherwise indistinguishable mortuary pattern with respect to the Bylas phase. Although these mortuary features closely conform to the local mortuary pattern, they are entirely unlike the typical Western Ancestral Pueblo flexed inhumations found in the Kayenta, Tusayan, and Chinle areas. Furthermore, examples of subfloor infant inhumation, which account for 45% of the entire Goat Hill phase mortuary population at the Buena Vista Ruin, are not found in the Kayenta or Tusayan areas. In contrast, two subfloor infant inhumations that date to the late thirteenth century were found at the Tse Ta'a Ruin in Canyon de Chelly District of the Chinle area (Steen 1966). Additionally, numerous subfloor infant inhumations that date to the thirteenth century have been reported from Chaco Canyon (Akins 1986), the San Juan Basin (Stanislawski 1963), Mesa Verde (Fewkes 1911; O'Bryan 1950; Reed 1958), and Sand Canyon (Johnson 2008; Martin 1936) areas. Thus, this practice appears to have emerged among Eastern Ancestral Pueblo communities in the mid-thirteenth century from where we believe it spread to the Chinle area. Moving southward, this practice somehow mingled with the Maverick Mountain Complex to become part of the late-thirteenth-century mortuary pattern within the SCSA.

Goat Hill Phase and the Maverick Mountain Complex

At this point, we clarify the important distinction between the Goat Hill phase and what we term the Maverick Mountain Complex. Based on research conducted by Haury (1958), Wasley (1962), and Lindsay (1987), the Maverick Mountain Complex consists of traits indicative of the Maverick Mountain phase found in the Point of Pines and the Bonita Creek districts in the Natanes Forestdale area. Thus, the Maverick Mountain Complex includes a mix of traits with obvious analogs found in the Kayenta, Tusayan, and Zuni areas, although the production of corrugated pottery is a hallmark of the Mogollon culture area. These traits include perforated plates, Maverick Mountain decorated ceramics, corrugated pottery, D-shaped kivas, entry boxes, flexed inhumation mortuary practices, wooden flower effigies, decorative wooden bird effigies, and other ceremonial items. It is also important to note that although well-represented within the Natanes Forestdale area, the Maverick Mountain Complex was primarily restricted to the Point of Pines and the Bonita Creek districts, and more specifically to the Point of Pines Ruin Locus B and Pueblo Devol Cliff Dwelling, as well as the Midnight Canyon Cliff Dwelling, Bonita Creek Cliff Dwelling, and Bonita Ceremonial Cave. The Goat Hill phase dates between AD 1280 and 1310 for sites that contain traits of the Maverick Mountain Complex but are found in a restricted geographic area (i.e., SCSA).

Found throughout the eastern portion of the SCSA, the Maverick Mountain Complex includes the traits associated with our revision of the Goat Hill phase. The Maverick Mountain Complex appears to extend into the

Aravaipa Sulphur Springs area, although here the full extent and nature of the Maverick Mountain Complex is poorly understood. For instance, Maverick Mountain pottery and perforated plates have been found in the northwest portion of the Aravaipa Sulphur Springs area. This includes the Klondike, East Galiuro Bajada, and Babcock districts. Evidence of the Maverick Mountain Complex is also present in the southern portion of the Lower San Pedro area, and it more or less includes elements of material culture used to define Gerald, Clark, and Lyons' (Gerald 2019) Sosa-Aravaipa phase. Notably, the presence of Maverick Mountain decorated ceramics, perforated plates, room block architecture with coursed masonry, entry box complex, and absence of fourteenth-century Salado polychrome types characterize the Sosa-Aravaipa phase. The Maverick Mountain Complex also extends into the Upper Gila and Mimbres Valley area particularly in the York, Duncan, and Redrock districts. Although the precise nature of the Maverick Mountain Complex within these districts remains unclear, its presence is signified by Maverick Mountain decorated ceramics and perforated plates to an unknown degree.

Room Count Estimates and the Migration Narrative

To further explore the nature of the Goat Hill phase as it relates to the Maverick Mountain Complex and to the Kayenta migration narrative proposed most notably by Jeffery Clark (Clark and Lyons 2012; Clark et al. 2013) and Patrick Lyons (Lyons 2014; Lyons and Lindsay 2006), we analyzed room count estimates reported from late prehispanic Western Ancestral Pueblo, Northwestern Mogollon, and Southeastern Arizona archaeological areas. For the Western Ancestral Pueblo and Northwestern Mogollon archaeological areas, the estimated room count data were based primarily on Adler and Johnson's (1996:258–262) tabularized summaries. The data associated with the Southeastern Arizona archaeological area was derived from a variety of sources, including Altschul et al. (2014), Black and Green (1995), Crary (1997), MacNider et al. (1989), Effland and MacNider (1991), Fewkes (1904), Germick and Crary (1992), Hill (2012), Hough (1907), Neuzil (2005), Phillips (1984), Sauer and Brand (1930), Smith (1979), and Touhy (1960). As per the archaeological areas, the estimated room count was organized chronologically according to fifty-year increments starting at AD 1100 and ending around AD 1400 (Figure 13).

Collectively, these room counts constitute a huge and highly relevant data set, yet several problems need to be addressed. Although the room count data for the Kayenta area appears to be adequate before AD 1200, estimates associated with the other areas in all three groups may be skewed too low. This appears to have been due to the continued use of pit house architecture and the obscure nature and reduced visibility of these sites. Other problems include room size and function, which can be abstractly used to extrapolate population estimates and is demonstrably the objective of this type of analysis. For example, in the Kayenta area room size tended to be small, and rooms were often arranged into interconnected three-room groupings with internal features suggestive of functional specificity, that is one household per room grouping. Conversely, in the Northwest Mogollon areas room size tended to be larger, yet individual habitation rooms were often found grouped with two much smaller utility rooms meaning a higher person to room ratio. In Southeastern Arizona rooms regardless of function were typically larger still also indicative of a greater person to room ratio. Thus, in the Kayenta area individuals are often calculated using per floor area (Brown 1987; LeBlanc 1971; Naroll 1962), which can account for three to four persons per three-room suite. Conversely, with greater floor area found in individual structures, five persons may be counted for a typical habitation structure found in the Southeastern Arizona areas. We additionally note that due to historical agricultural development in the Southeastern Arizona areas the general visibility of unexcavated sites and the sparsity of reliable survey coverage and reports significantly hinders accurate room-count estimates, particularly in the Upper San Pedro River and Aravaipa Sulphur Springs areas. Thus, as an important caveat, the room-count estimates found in Figure 13 can only be used in a general sense.

Nevertheless, several pertinent observations can be made despite these deficiencies. The data for the Kayenta and Chinle areas (Adler and Johnson 1996) indicate that the largest number of rooms were constructed immediately before they were abandoned in the late thirteenth century. Following this abandonment, there were precipitous increases in room construction in the adjacent or nearby Tusayan, Middle Little Colorado, Natanes Forestdale, Silver Creek, and Ancha Cibecue areas in the early fourteenth century, which is supportive of an Kayenta immigration. However, in the Southeastern Arizona group, particularly the San Carlos Safford and Tonto Globe areas, the largest estimated number of rooms date to the late thirteenth century. Moreover, although we identify modest increases in the estimated number of rooms in the Lower and Upper San Pedro River areas as well as in the Aravaipa Sulphur Springs area, far fewer rooms were occupied in the San Carlos Safford and Tonto Globe areas during the early fourteenth century.

We interpret the estimated room count data to indicate that as the Kayenta and Chinle areas depopulated in the late thirteenth century, most refugee populations

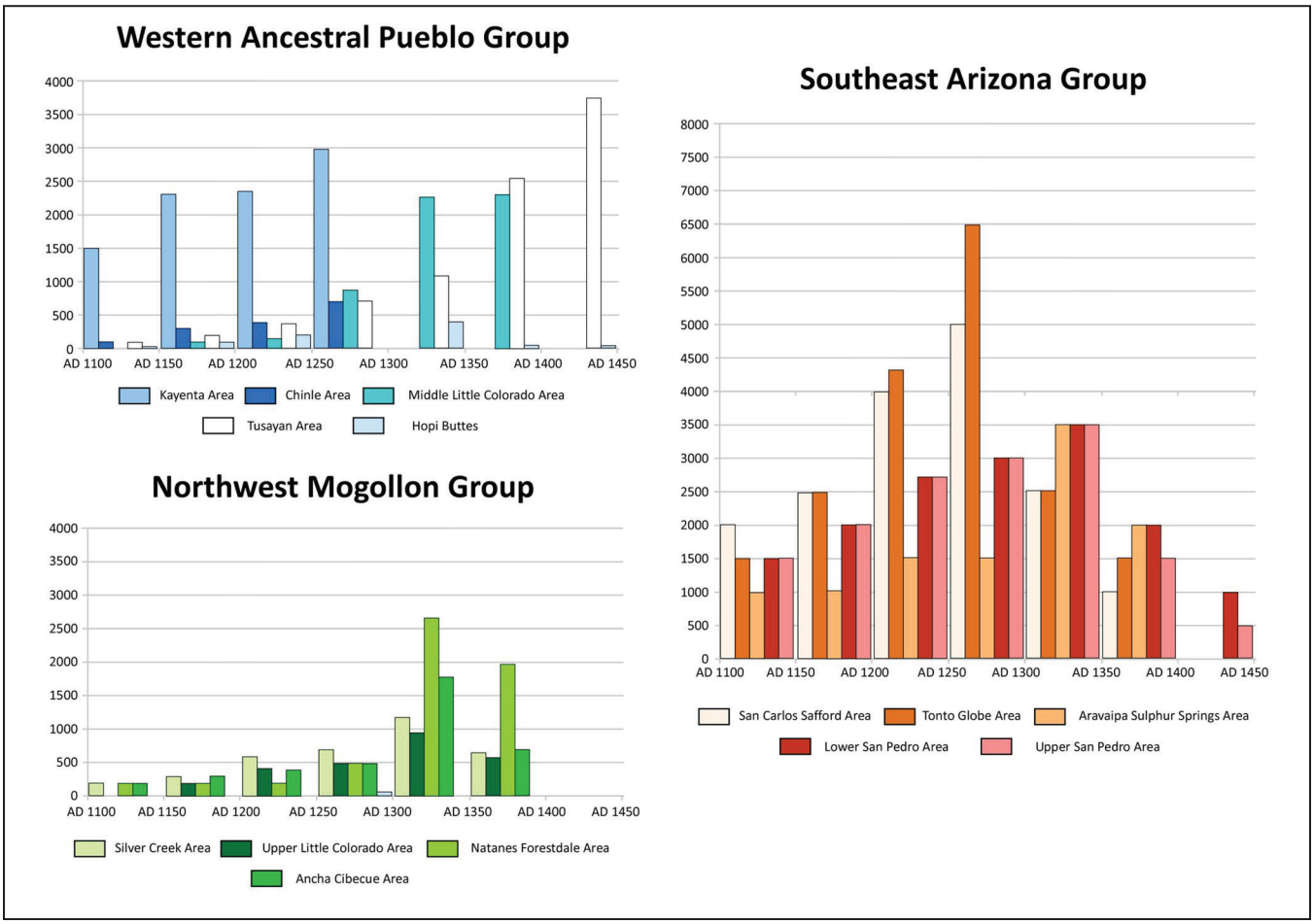


Figure 13. Chronological sequence of the estimated room count data for the archaeological areas associated with the Western Ancestral Pueblo group, the Northwest Mogollon group, and the Southeast Arizona group. The source data for this analysis provided in Adler and Johnson (1996), Altschul et al. (2014), Black and Green (1995), Crary (1997), MacNider et al. (1989), Effland and MacNider (1991), Fewkes (1904), Germick and Crary (1992), Hill (2012), Hough (1907), Neuzil (2005), Phillips (1984), Sauer and Brand (1930), Smith (1979), and Touhy (1960).

were initially absorbed and integrated within the Middle Little Colorado River and Tusayan areas. Thus, in general, the room count data seems to support Hopi oral tradition and the associated Kayenta Migration narrative. The data also suggest fewer refugees integrated into communities found within the Silver Creek, Upper Little Colorado, Ancha Cibecue, and Natanes Forestdale areas of the Northwest Mogollon group. Yet strangely in the areas that would potentially be most affected by these demographic trends, there is very little evidence of this process's impact. For example, other than the adoption of perforated plates found at fourteenth-century Tusayan settlements we identify little to no Kayenta or Chinle influence on decorated ceramics, settlement structure, residential and ritual architecture, or mortuary patterns. Turning to the Northwest Mogollon group and the Upper Little Colorado and Silver Creek areas that would have theoretically received fewer Kayenta and Chinle refugees, the apparent degree of Kayenta and Chinle influence was slightly greater. Although not overwhelming in the late thirteenth century, the most obvious evidence of this is found in the few occurrences of perforated plates and the more important development of the Pinedale decorative style within the White Mountain Red Ware and nascent Salado polychrome series.

Moving south to the Ancha Cibecue and Natanes Forestdale archaeological areas, where the room counts suggest even fewer Kayenta and Chinle refugees settled, the trend toward negligible cultural influence seems reversed. Between AD 1260 and AD 1300, in the Ancha Cibecue area, there were perforated plates and the Pinedale-style-inspired Cedar Creek Polychrome, as well as Pinto Black-on-red and Polychrome pottery. However, in the Natanes Forestdale area, Pinedale style ceramics prevailed with incipient Point of Pines Polychrome, as well as decorated pottery associated with the Maverick Mountain Complex. Nevertheless, the use of Pinedale

style White Mountain Red Ware and, to a lesser degree, Salado polychrome ceramics was rather widespread throughout the Natanes Forestdale area. Conversely, we describe the traits associated with the Maverick Mountain Complex as somewhat restricted to the Point of Pines and Bonita Creek districts.

Farther south, the estimated room counts from the various archaeological areas in the Southeast Arizona group provide no discernable evidence for a population influx in the late thirteenth or early fourteenth centuries even though several undisputable enclaves exist. Quite the contrary, despite rapid aggregation and an increase in residential site size both the San Carlos Safford and Tonto Globe areas seemed to have suffered significant decreases in the number of rooms occupied. Due to extensive agricultural development in the SCSA in the late nineteenth century, this process is far more evident in the Tonto Globe area. Yet, during the Goat Hill phase it is clear that many of the traits associated with the Maverick Mountain Complex extend into the SCSA, as well as portions of the Lower San Pedro area. Therefore, we suggest that far fewer refugees associated with the Kayenta and Chinle diaspora found their way to Southeast Arizona. Nonetheless, when addressed collectively the estimated room counts with the related material assemblages appear counterintuitive. It seems that that the expression of late thirteenth-century Kayenta, Tusayan, Chinle, and possibly Zuni cultural influence increased the farther away from the abandonment epicenter up to about 400 km.

CONCLUSIONS

We have proposed a revision of Neuzil's (2005) Goat Hill phase of the San Carlos Safford area of southeastern Arizona, based on the architectural and artifactual traits found at the Goat Hill and other related sites, in order to better refine the regional chronology and more accurately delineate cultural trends. Our discussion of these traits focused on the technical aspects of Maverick Mountain pottery, sherd count data, corrugated pottery or lack thereof, perforated plates and their potential alternative uses, residential and ritual architecture, as well as mortuary patterns. We also discuss the Goat Hill phase in terms of the Maverick Mountain Complex and room count estimates used to explore the chronology and demographic nature of late thirteenth-century migration in the American Southwest. Analysis of this information found elements of material culture that are consistent with the Kayenta migration narrative proposed by Haury (1958), Brown (1973), Lindsay (1987), Woodson (1995), Lyons (2003), Clark and Lyons (2012), Clark et al. (2013), Gerald (2019). However, we suggest that many Tusayan groups may have been more influential in the cultural manifestations during the Goat Hill phase than previously recognized. Furthermore, many other aspects defy a single explanation for the Goat Hill phase, such as arguments for site unit intrusions or the migration and resettlement of a single ethnic group with respect to social distance. Collectively, these geographically discrete, intrusive, yet debatably related set of cultural traits lead to the formulation of the Maverick Mountain Complex. Although the preponderance of the evidence supports some form of migration, we question the model of migration as restricted to stable social units such as the clans of nuclear families or unclear references to multiscalar coalescence as the sole cause for the Goat Hill phase. Instead, we propose an alternative model that operated in tandem with that described by Clark and Lyons. Importantly, we suggest the cultural processes of migration and ethnic intermingling that characterize the Goat Hill phase material culture found patchily throughout the SCSA, initiated around AD 1280, occurred rapidly, and were perhaps resolved in a single generation by AD 1310, or at latest AD 1325. We also suggest that similar processes of Kayenta/Tusayan immigration in other areas of southeastern Arizona, such as at the Davis Ranch and Reeve Ruin sites and other Lower San Pedro locations, may have initiated earlier and extended over a slightly longer temporal duration (e.g., AD 1265–1325).

Although well beyond the scope of the current study, several factors suggest that endemic internecine warfare in the mid-thirteenth century likely played a pivotal role in the eventual abandonment of the Kayenta area (Haas and Creamer 1993). Furthermore, these factors hint at the formation of the Maverick Mountain Complex and the resettlement of these populations in the late thirteenth century. First, tree-ring dates associated with the room count estimates indicate the process of Kayenta aggregation and local depopulation events occurred before the onset of the Great Drought of AD 1275–1300. Second, the pervasive defensive nature of Kayenta, Chinle, and Tusayan sites between AD 1250 and 1300 suggests increased warfare during this interval (Haas and Creamer 1993). Overall, this trend is manifested in terms of settlement location, aggregation, structure, and architectural design. Third, although limited, evidence of wounds found among members of the mortuary population in these areas also indicates the increased importance and intensity of some kind of organized warfare (Haas and Creamer 1993). Fourth, the composition of the terminal Kayenta and Chinle area mortuary populations was overwhelmingly composed of adult females. Another factor is the counter-intuitive evidence associated with the estimated room counts.

These data imply minimal cultural influence or interaction with short-range, large-scale demographic

movement and maximal cultural influence with long-range small-scale demographic movement. Consequently, we question why the Kayenta influence within the Tusayan and Middle Little Colorado areas can be viewed as nearly negligible, whereas its impact farther south in the SCSA is viewed as transformative? It is possible that the integration of the numerically large Kayenta population within Tusayan and Middle Little Colorado communities was highly dispersed, fragmented, and was primarily composed of culturally passive elements which acted to dilute their impact or that Kayenta integration was more readily facilitated into Tusayan and Little Colorado communities given a greater shared heritage. These factors would limit archaeological discontinuities associated with immigration. On the other hand, farther south, smaller Kayenta or Tusayan groups may have been more concentrated, isolated, and primarily composed of more aggressive cultural elements. Here, with the defensive nature of many of the settlements affiliated with the Maverick Mountain Complex, there appears a radical change in the settlement system, localized depopulation events, and increased aggregation. Again, we suggest warfare as evident in burned structures, destroyed foodstuffs, and unburied bodies such as those found at Point of Pines (Haury 1958; although see Rodrigues 2008 for an alternative interpretation) and Buena Vista Ruin (Mills and Mills 1978), although the specific outcome of immigrant-local interactions likely varied. Nevertheless, we question the traditional model of the Kayenta migration as 'mostly peaceful,' sustainable, and restricted to stable social units such as clans and families. To this end, an alternative model of migration is needed. One possibly based on the band and warfare, in theory somewhat more akin to the Athabaskan inspired Southwestern Apache, Shoshonean Comanche, Yavapai, or the Eurasian Goth and Hun of late antiquity.

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HOHOKAM CRAFT PRODUCTION: NEW EVIDENCE FROM THE MASSERA RUIN (AZ U:10:22[ASM])

Ryan Arp and Steve Swanson

Craft production in the prehistoric Hohokam culture area of Arizona has long been a subject of study, particularly for their painted ceramic containers, shell jewelry, and carved stone items. Archaeologists understand that Hohokam material culture items were produced by households at numerous settlements ranging in scale from small hamlets to large, complex villages. Crafts were produced across the region, not just in settlements near core population areas. We describe a recently excavated crafting workshop at the Massera Ruin along the Queen Creek drainage that appears to have emphasized ceramic production, but also participated in shell production. Evidence for the co-location of two very different crafts in a single domestic-style structure has interesting implications for the context and scale of crafting in Hohokam communities.

Queen Creek is a relatively small, intermittent stream tributary to the Gila River located southeast of Phoenix (Figure 1). Recent ceramic temper-based studies suggest that potters in the Queen Creek area produced red-on-buff ceramics virtually identical with those produced more abundantly along the Middle Gila at Snaketown (Lack et al. 2012). Despite this, no direct evidence for ceramic production has been demonstrated for the Queen Creek area. In this paper we describe a recently excavated crafting workshop that appears to have emphasized ceramic production, but also participated in shell production. Evidence for the co-location of two very different crafts in a single domestic-style structure has interesting implications for the context and scale of crafting in Hohokam communities. In this paper we describe excavations at the Massera Ruin along the Queen Creek drainage that have implications for pottery production and shell manufacturing.

Hohokam Craft Production

Evidence for Hohokam craft production is primarily indirect and based on the discarded or dropped objects found in Hohokam sites, or based on characterizing source materials in a finished object. In a very few cases, archaeologists have been fortunate to identify places where crafts, such as ceramic vessels or shell bracelets, were produced (e.g., McGuire and Howard 1987; Seymour 2017; Shepard 1965; Sullivan 1988; Woodson 2011). Although it has been suggested that Hohokam craft production was organized at the household level (Hagstrum 1995; Mills and Crown 1995), at Snaketown it appears that ceramic production occurred in a courtyard-like setting involving multiple households (Haury 1976:194–197; Woodson 2011:132, Figure 2).

Indirect evidence of ceramic production in the Phoenix Basin area exists in the form of sourcing studies that model Hohokam ceramic organization based on ceramic compositional and statistical analyses of ceramics from Hohokam sites and studies of temper sources (Abbott 1994, 2000, 2001a, 2001b, 2001c). Direct evidence of pottery production is rare in the Southwest, and attempts to identify pottery production areas require an understanding of the kinds of recoverable features and artifacts in the form of kilns, clay mixing basins, tools and raw materials. Tools identified together as a potter's toolkit include lithic "scoops" (apparently large, flat flakes) and choppers used to process clay, stone anvils and polishing stones for vessel shaping and smoothing, and mortars used in processing pigments for paint (Haury 1976; Lascaux and Ravesloot 1993:44–45). Processed and "raw" materials include unfired clays, ochre, and minerals or other temper (Shepard 1965; Woodson 2011). Direct evidence of the tools and features used to produce pottery enhances our understanding of the process involved, the scale of production, and insights into the organization of production within Hohokam society (Woodson 2011).

For the Phoenix Basin, Woodson discusses seven Hohokam sites with direct evidence for pottery production (2011). For four of the sites, there is not sufficient evidence to identify the loci or scale of production (Gila Butte, Las Canopas, Las Colinas, and Rattlesnake Hill sites). The remaining three sites have sufficient evidence to understand production context (Snaketown, Maricopa Road, and Sweetwater sites).

At Snaketown, the ceramic production area was in a courtyard formed by five domestic structures and

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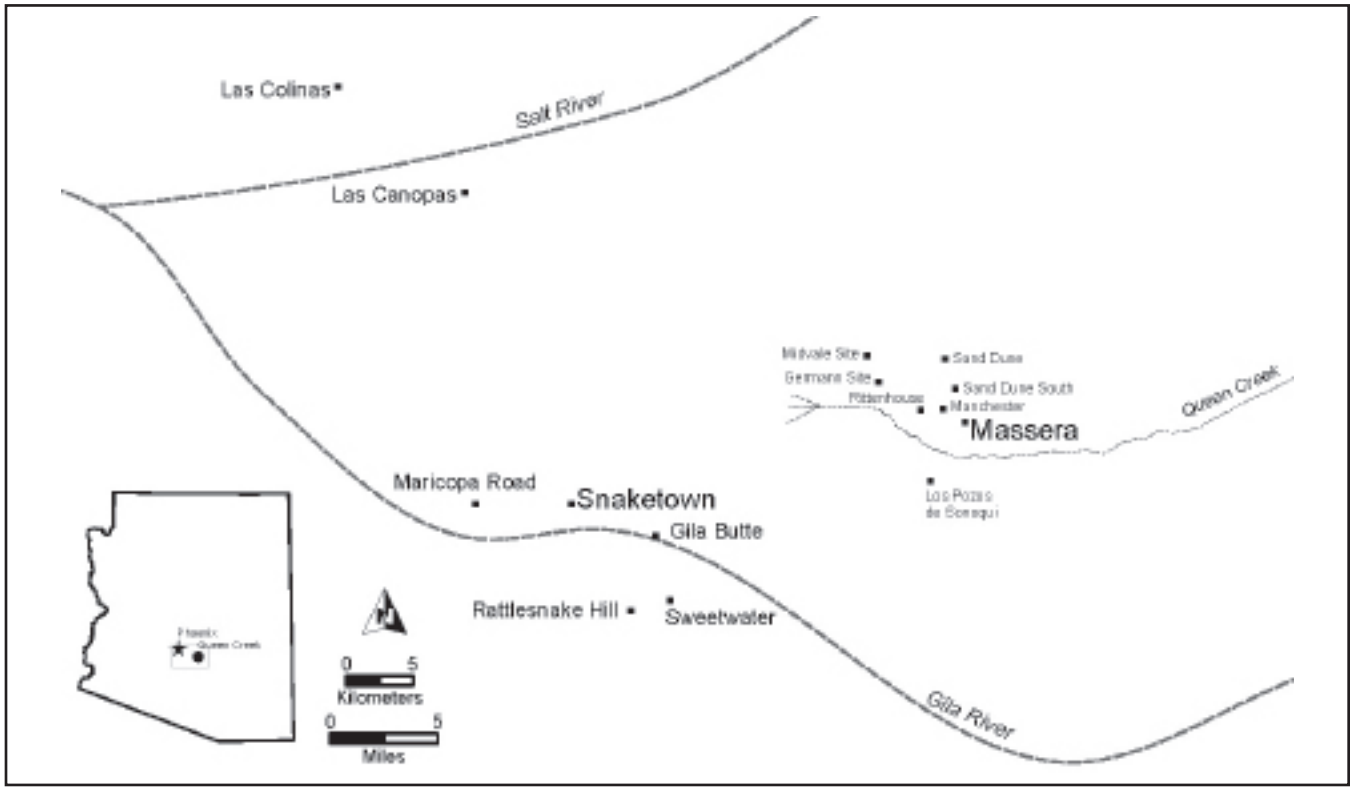

Figure 1. Regional map showing the locations of the Massera ruin and sites mentioned in the text.

a Sacaton phase "Type S-3 structure," which Haury (1976:62) interpreted as something similar to a Pima council house, a communal facility. The presence of the "council house" may be significant, as there are only three of these unique Sacaton-phase structures at Snaketown, and all are within 60 m of the ceramic production area. The multiple structures, puddling pits, and kilns in the ceramic production area likely reflect kin-group or other suprahousehold craft production. The proximity of possible communal or administrative S-3 structures suggests less independence for the ceramic craft specialists at the site (*sensu* Costin 1991, cited in Woodson 2011). Also at Snaketown, Seymour has analyzed loci of shell ornament/jewelry production in multiple households that appear to reflect kin-group craft production, above the level of the individual household (Seymour 2017).

At the Maricopa Road site, Arizona State University (ASU) archaeologists were only able to excavate the very westernmost portion of the site in their project area but were able to identify a shell production workshop in a structure, and an extramural ceramic production area outside the structure, both dating to the late Sacaton phase (Lascaux and Ravesloot 1993). Each workshop included craft production toolkits and raw materials for their respective crafts. The ceramic workshop also had puddling pits; a kiln was suspected immediately west of the excavation area (Lascaux and Ravesloot 1993). A large mound structure, presumably contemporaneous, was located just north of the workshops.

The Sweetwater site was excavated by Gila River Indian Community (GRIC) archaeologists, who identified an extramural ceramic workshop just outside the settlement, in an agricultural, canal-side setting (Woodson 2011). The pottery workshop had fired and unfired lumps of clay, pottery making tools (anvils, mano and metate, pestle, polishing stones, cores, hammerstones and flaked stone). Raw materials included pieces of mica schist, a piece of chrysocolla, and quartzite rocks (Woodson 2011:135–137).

Seymour analyzed house floor and fill contents at Snaketown and identified workshops suggesting that kin-based groups may have crafted shell items part-time (2017). In examining Sacaton phase houses, she found the majority of evidence for shell production was restricted to five houses in three areas of Snaketown, including: houses near the platform mound (Mound 16) in the north-central portion of the site; on the eastern portion of the site by Ballcourt 2; and at the western edge of the site south of Ballcourt 1 that was separated by a vacant, flat area (Seymour 2017:821). This restricted distribution is interpreted as evidence for intracommunity exchange over an elite-controlled distribution model (Seymour 2017:824–825).

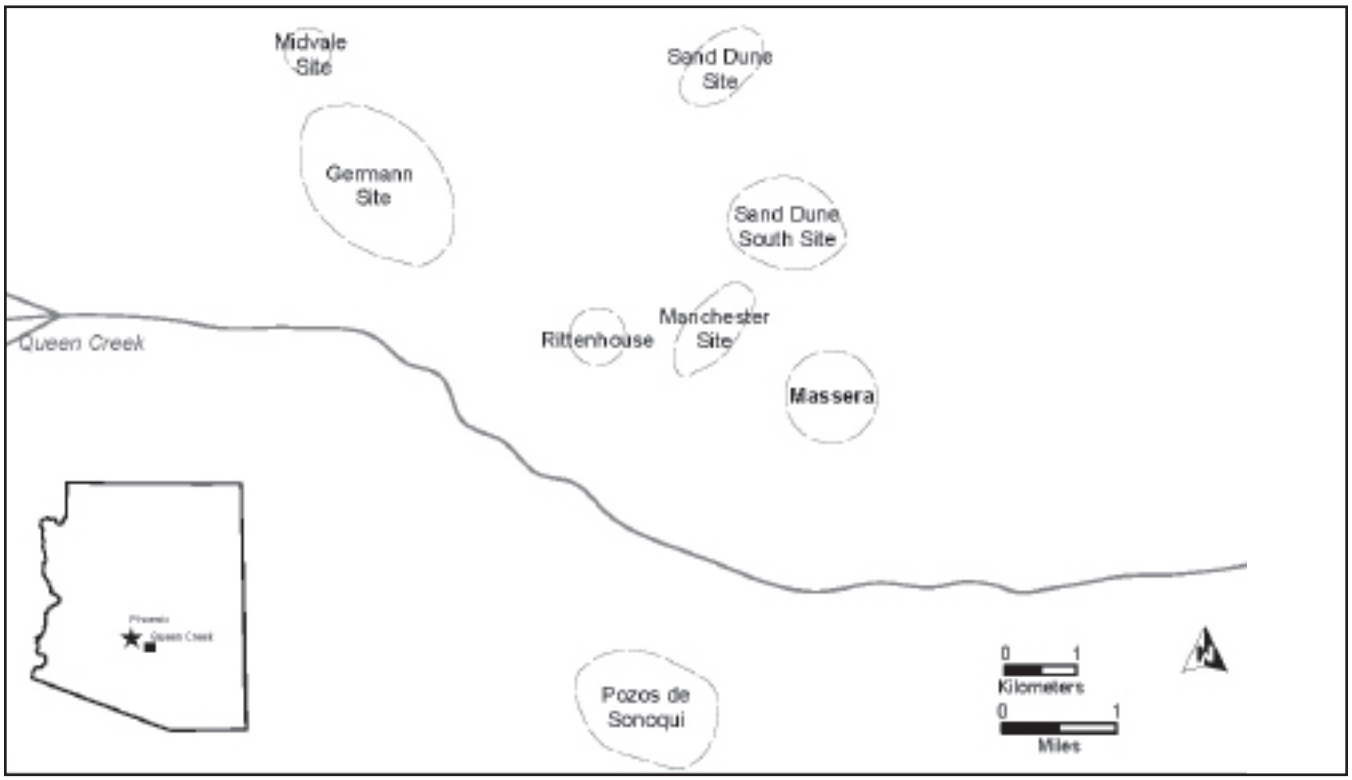

Figure 2. Large archaeological sites in the central Queen Creek area.

McGuire and Howard (1987:122–123) note the distribution of shell production activities as different between regions when discussing Hohokam shell exchange. The western Papagueria was producing and trading shell with the Phoenix Basin Hohokam in the Colonial to Sedentary periods. In the middle-to-late Sedentary period, McGuire and Howard (1987:137) note a shift in local shell production that intensifies into the Classic period where shell jewelry was produced under elite control.

It appears that the scale of production of those sites with more direct evidence is at a smaller scale, with two examples of multiple crafting activities occurring within a concentrated area close to more specialized structures. Interestingly, historic O'odham potters have been observed producing pottery only during dry months outside of crop harvesting times (Kelly and Heidke 2016; Naranjo 2002). Perhaps shell jewelry production allowed additional crafting to occur during the wet months outside of harvest time. The evidence that both crafting activities occurred in the same structure, and in the same workspace, strongly suggests that a single person or family produced two very different products.

Hohokam in Queen Creek

Hohokam settlement of the Queen Creek area occurred by at least the AD 600s with the establishment of a series of hamlets or small villages (Teague and Crown 1984, see Table 1 for chronology). Larger villages with ballcourts were established by the AD 800s, indicating participation in larger Hohokam economic and social realms (Wallace 2001; Wilcox and Sternberg 183). Occupation of the area continued during the Hohokam Classic period (ca AD 1100s–1400s), establishing strong ties to upstream Salado-affiliated peoples to the east in the Globe, Arizona area (Ossa and Gregory 2018; Wood 2016). Despite proximity to large settlements along the Gila River south and west of the San Tan Mountains, ceramic studies have suggested closer ties with people in Phoenix Basin sites along the Salt River (Abbott 2009). Furthermore, analyses of ceramic tempering materials suggest that pottery production occurred in the Queen Creek area, with Queen Creek potters presumably making local varieties of red-on-buff pottery (Crown 1984; Lack et al. 2012; Leonard 2007). This hypothesis has been further bolstered by the discovery of a probable potter's workshop at the Massera ruin, a rarely documented Hohokam feature which is described in this paper.

Queen Creek is an ephemeral drainage that originates near Fortuna Peak in the Pinal Mountains and flows intermittently through the mountains until it reaches the valley floor. From the valley floor it is overlaid with a ribbon of dense vegetation, flowing completely

Table 1. Cultural Chronology of the Phoenix Basin (Adopted from Dean 1991)

Hohokam Period	Phase	Date Range
Protohistoric	–	post-AD 1450
Post-Classic	Polvorón	AD 1375–AD 1450
Classic	Civano	AD 1300–AD 1375
	Soho	AD 1150–AD 1300
Sedentary	Sacaton	AD 975–AD 1150
Colonial	Santa Cruz	AD 850–AD 975
	Gila Butte	AD 775–AD 850
Pioneer	Snaketown	AD 700–AD 775
	Sweetwater	AD 600–AD 700
	Estrella	AD 500–AD 600
	Vahki	AD 300–AD 500
	Red Mountain	AD 1–AD 300

underground except during flood events, when it can inundate several square miles. During flow events, it eventually empties into the Gila River (Schaafsma and Countryman 2018).

Numerous excavation projects in the Queen Creek area have increased our knowledge about the prehistory of the area, and the area's ties to both Hohokam and Saladoan cultures. The Queen Creek area has been subjected to several excavations related to infrastructure and development projects since the early 1990s (e.g., Chenault 2015; Hart and Craig 2006; Leonard 2007; Rayle and Swanson 2019; Tremblay et al. 2017; Vorsanger 2017; Wenker et al. 2000). Major Hohokam sites within the Queen Creek area include the Massera, Sand Dune, Manchester, *Los Pozos de Sonoqui*, and Rittenhouse sites (see Figure 2). These villages all included pithouses, ballcourts, middens, water features, and cemeteries.

Massera / AZ U:10:22(ASM)

Frank Midvale visited Massera in the 1940s as it was being leveled for farming and identified a rough site boundary and a ballcourt (Rayle and Swanson 2019; Schoenwetter et al. 1973). Midvale described the site as a prehistoric Hohokam village with a probable east–west-oriented ballcourt, artifact-rich mounds, concentrations of ceramic and ground stone, and signs of human cremation burials (Schoenwetter et al. 1973). Figure 3 shows the testing and excavation results at Massera.

SWCA Environmental Consultants (SWCA) surveyed approximately 640 acres in support of residential development in the late 1990s, which resulted in a recommendation for Phase I testing at the Massera Ruin (Wenker 1999). In 2000, SWCA performed Phase I testing on most of the site of Massera and revealed 25 features, including a human cremation burial, pithouses, trash-filled pits, pits containing charcoal and artifacts, and charcoal-stained soil deposits with artifacts (Wenker et al. 2000). SWCA archaeologists conducted Phase II excavation in the south portion of the site, revealing a dense band of residential structures, burned and unburned pits, and cemetery areas. Based on decorated ceramics, SWCA identified a possible occupation span from the late Colonial through Sedentary periods (Tremblay et al. 2017).

In 2017, Environmental Planning Group (EPG) conducted Phase I and Phase II excavations in the northern portion of the site (Lonardo 2017; Rayle and Swanson 2019; Vorsanger 2017). Mechanical trenching revealed nearly two dozen features, including pit structures, thermal features, unburned pits, and two small reservoirs along with the ditch that presumably filled them. Decorated ceramics recovered from excavated features suggest use of the north portion of the site as early as the Gila Butte phase through the end of the Sacaton phase (AD 750–950). Radiocarbon ages from three architectural contexts are consistent with the production ranges of the later ceramics reflecting a late Sacaton occupation of this portion of the site.

EPG excavated four whole or nearly whole pit structures (Features A, E, F and P), and portions of two other earlier, superimposed structures (Features O and Q). Three of the pit structures (Features A, F, and P) had

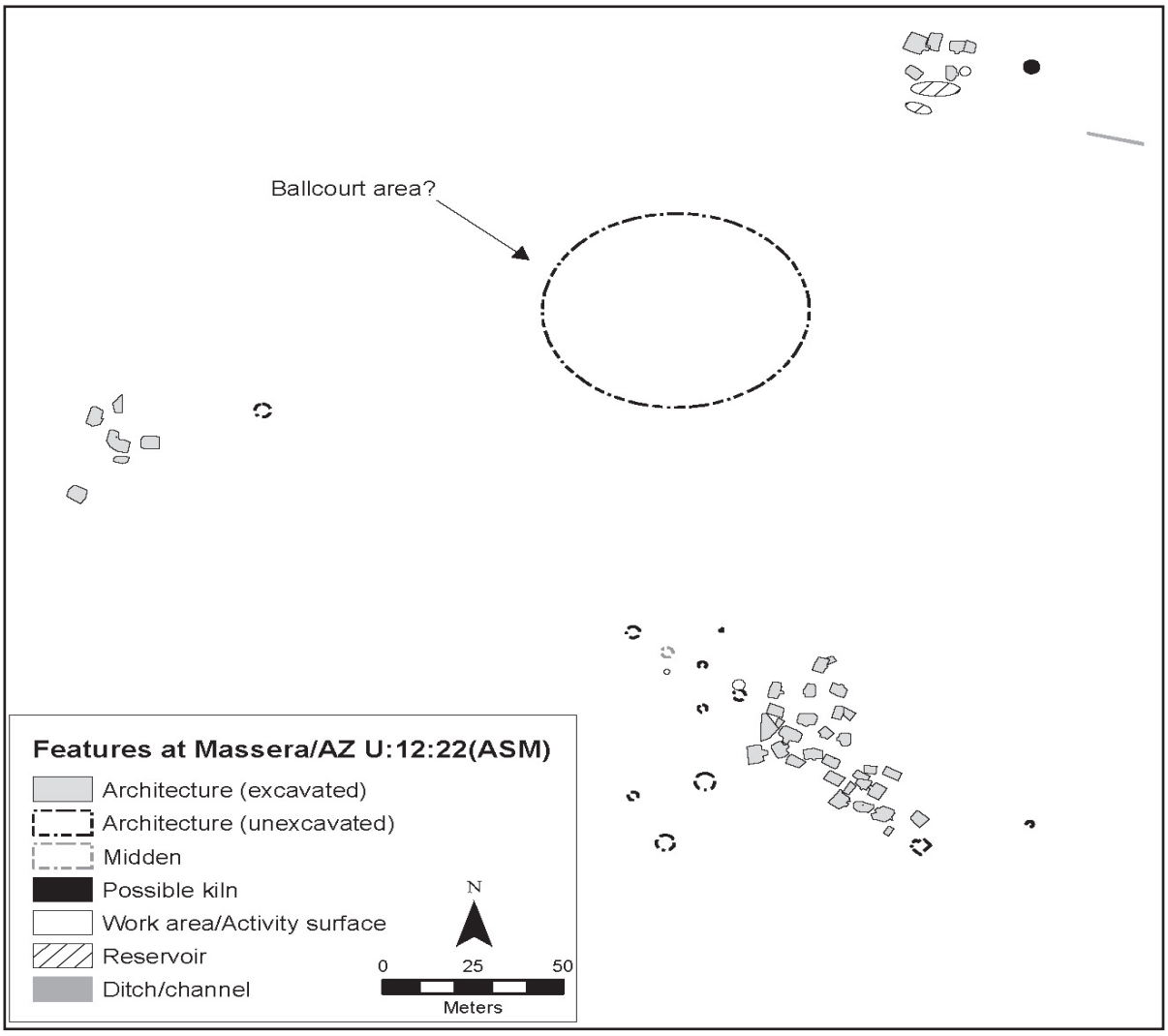

Figure 3. Features at Massera ruin.

unique assemblages, which suggested nondomestic activities (see map in Figure 4 and aerial view in Figure 5).

Feature F is an unusual structure for its large size (34.2-m^2 floor area) and its dearth of domestic artifacts and features, similar to what Haury classified as a "type S-3 structure," thought to have served as a community meeting place associated with village leadership (Haury 1976: 57-62) that likely grew out of earlier "big house" structures (*sensu* Wallace and Lindeman 2012:37). Like the three type S-3 structures at the Snaketown site, Feature F is much larger than domestic structures at the site, its doorway facing in a roughly cardinal direction, and offset to the right of center when facing the doorway from inside the structure. As was the case for S-3 structures at Snaketown, Feature F is located at the edge of the village, rather than centrally located, and also burned catastrophically. Interestingly, the S-3 structures were located adjacent to (and in the case of structure 18:10G, formed a wall of) a ceramic production area.

Feature F appears to be roughly contemporaneous with the S-3 structures at Snaketown, which Haury assigned to the Sacaton phase, based mostly on structure superpositioning (1976:62). Although few ceramics were present on Feature F, diagnostic sherds had production ranges from the late AD 700s through AD 950. A deep firepit in Feature F contained charcoal from both oak and pine (pinyon or ponderosa). In their map of biotic communities in the US Southwest, Brown and Lowe plot the nearest Madrean evergreen woodland area (oaks) in the mountains 56 kilometers to the east at elevations above 1,370 meters (4,500 feet) above mean sea level (1980). Burned wood from this firepit yielded a radiocarbon date of cal AD 862–994 (Beta - 489791).

The room identified as Feature P was unusual for several reasons. First, the entire rear half of the room was filled with large, broken jars, many painted, many

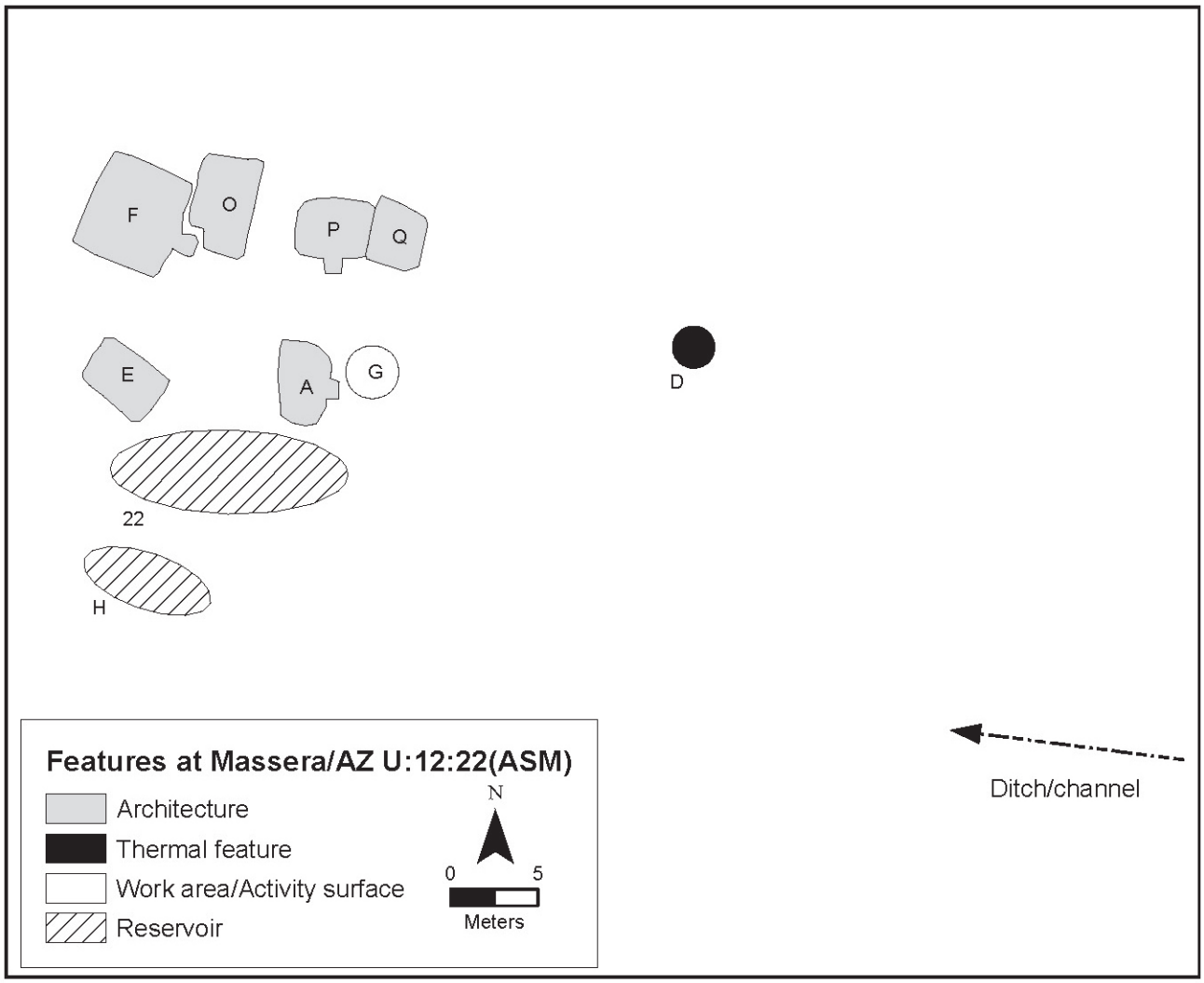

Figure 4. Features excavated in northern portion of Massera ruin.

capable of holding several gallons of material. In one corner of the room, a possible mosaic or inlay of hematite was present in the floor, with a possible zoomorphic outline. The front entry was virtually blocked by a trivet comprised of three large clay "cones" that would have supported a very large vessel. A small fire had been placed under the vessel on the room floor, mostly of twigs and smaller branches, perhaps to keep vessel contents warm. The location of the vessel, essentially blocking the entry, suggests access to its contents from outside the structure. No evidence for burned food remains are present; however, agave phytoliths were identified in pitted areas of vessel interiors, which is suggestive of agave fermentation (Simon et al. 2006; Swanson et al. 2008; Van Buren et al. 1992). Like feature "F" next-door, decorated ceramics in the room have production ranges from the late AD 700s through AD 950 and Feature P had a radiocarbon date from burned roof fall of cal AD 892–1014 (Beta - 489793), suggesting it was possibly contemporaneous with neighboring structures.

Feature A differs from a typical domestic structure as a result of an unusual feature and a unique artifact assemblage suggesting craft production and is the focus of this paper (Figure 6). In the figure a trench from Phase I testing intersected the rear wall of the structure, and we have little information from the area. The remainder of the structure was excavated by hand, with fill between roof-fall and the floor passed through $^{1}/_{4}$-inch screen. All floor features were excavated and flotation samples collected from floor depressions, storage pits, beneath clay pedestal, and hearth (F-A.1 through F-A.5). East of the structure and north of its entry is Feature G, an area of ash-covered, oxidized sediment and charcoal and a possible burned post, but no evidence for walls or a prepared floor surface. Excavators interpreted the feature as a possible ramada or other extramural work area associated with the structure. Even further to the east, a backhoe trench

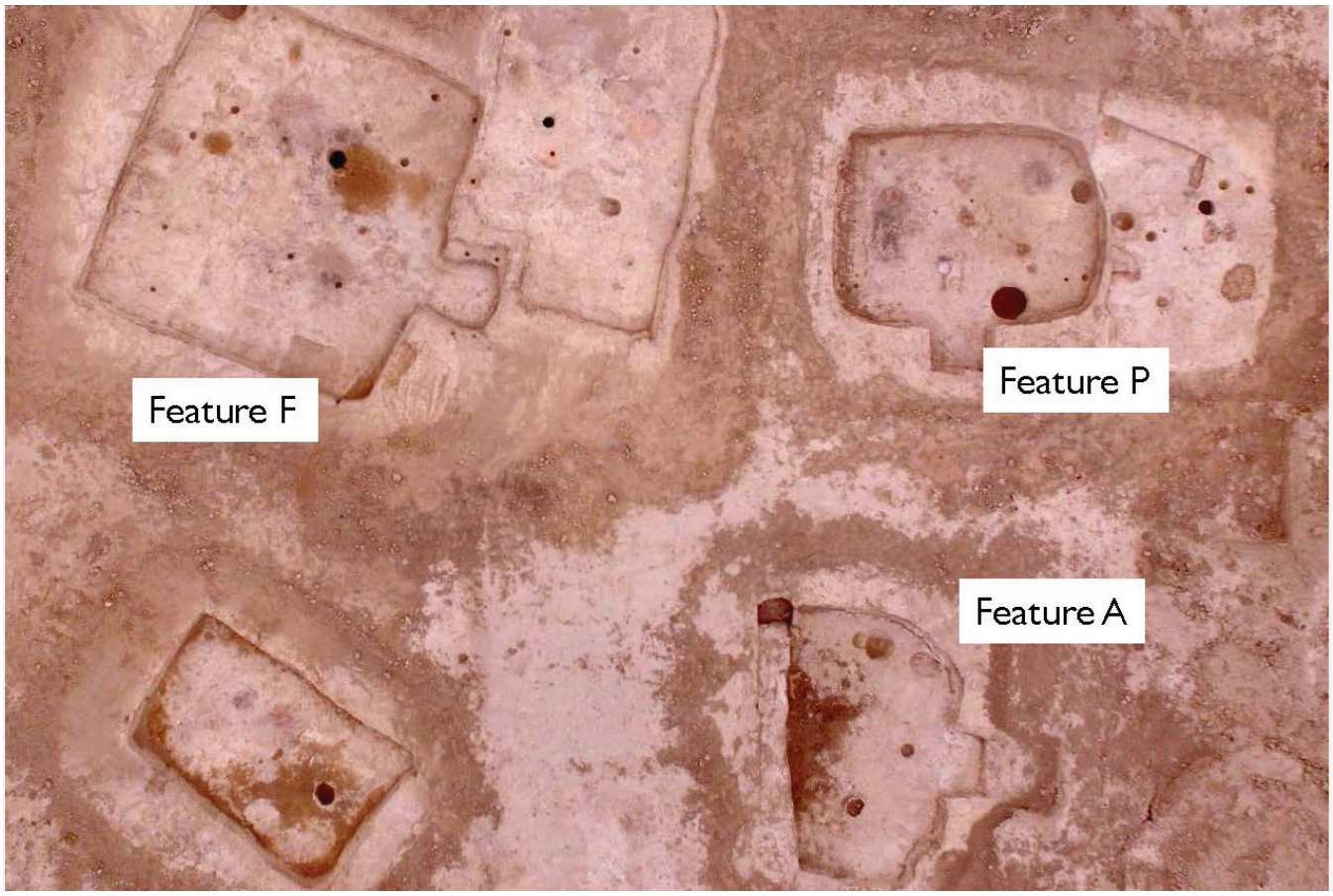

Figure 5. Detail of structures excavated by EPG in northern part of Massera.

bisected a large thermal feature with abundant ceramics. Although truncated by blowing, the upper portion of the feature was 2.3 m in diameter.

Environmental Planning Group and SWCA, two environmental consulting firms in Phoenix, Arizona, conducted data recovery excavations at Massera in advance of residential and commercial developments (Rayle and Swanson 2019; Tremblay et al. 2017). Working in the southern portion of the site, SWCA identified no large canal features, but a series of small reservoirs or pits were encountered in various locations at the site.

Chronometric data from diagnostic ceramic types and radiocarbon samples from site features indicate residential village occupation in the northern portion of Massera occurred primarily during the Colonial period (ca. AD 750–1000). Information from the rest of the settlement suggested longer-term occupation from the Snaketown phase (AD 700–775) through the Polvorón phase (AD 1375–1450) (Tremblay et al. 2017).

Description of Feature A

Feature A consisted of a subrectangular pit structure with a plaster-lined hearth (Subfeature A3), three subfloor pits (Subfeatures A1, A2 and A4), and a clay pedestal (Subfeature A5; Figure 7 and Figure 8). Almost a dozen fired and unfired vessels were found throughout the room along with other artifacts, as well as minerals (micaceous schist) used as temper in Hohokam pottery. The structure measured approximately 5.0 × 4.1 m north–south and was approximately 0.5 m deep. The rear wall of the structure was destroyed by a backhoe trench during testing.

Mechanical stripping and hand tools exposed the feature in plan view. The room's fill was hand excavated, with 50% (east half) passed through ¼ inch screen to increase artifact recovery. All diagnostic or unique artifacts were point plotted (PP) and collected. At floor level, an approximate 5-cm-thick deposit was carefully excavated to reveal artifacts resting on the room floor and a subfloor feature. An entry was identified near the center of the eastern side of the structure based on its position relative to the hearth. Neither plaster nor postholes were encountered at floor level. Macrobotanical analysis of feature fill revealed wood charcoal remains (mesquite, saltbush, and mountain mahogany) that represents possible structural material.

The room was filled with nine fired vessels (PP-5,

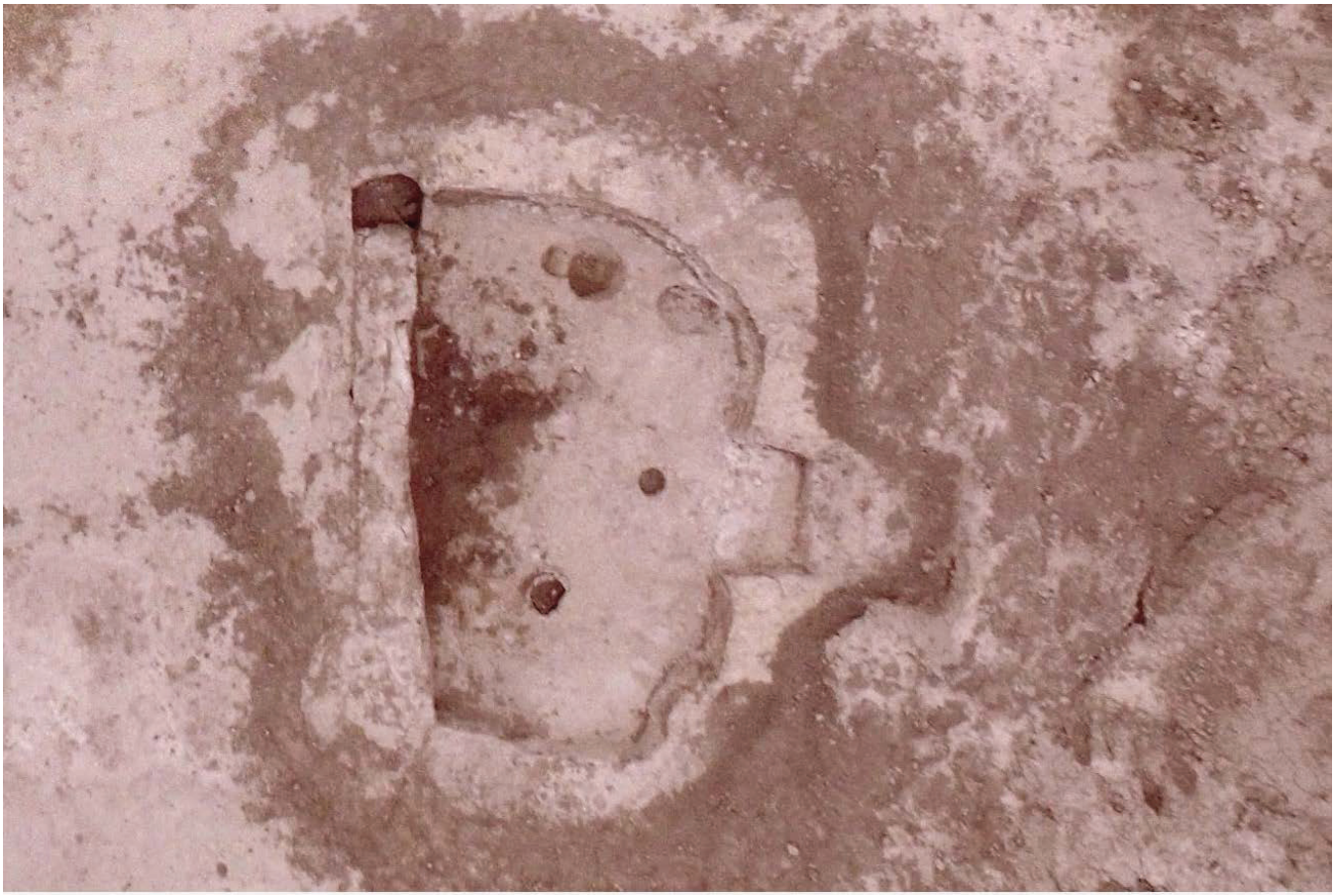

Figure 6. EPG feature A at Massera, a pit structure that was a possible craft workshop.

PP-7 through PP-11), as well as two unusual, unfired clay objects (PP-1 and PP-2). During excavation, these objects appeared to be unfired, leather-stage pots that had been partially crushed, and then fired when the room burned. After excavation, thin section analysis showed no temper present. David Abbott of ASU examined the objects and suggested they may have been raw clay placed in baskets. In addition to the ceramic vessels, floor fill included abundant tabular schist fragments and mica flakes. Prepared red ochre cakes had been cached in the southeast corner of the room. Red ochre's color was enhanced by intense heating, then ground and compressed into cakes for use in paint preparation.

Near the north wall of the pit structure is a bilobed subfloor pit (Subfeature A.1). Along with sherds, small bits of charred maize, and charred saguaro seeds, this storage pit contained an abundance of unworked and worked shell artifacts. These included beads, bracelets, and pendant fragments, suggesting shell production was conducted in Feature A.

An oval depression (Subfeature A.2) in the northeast corner of the structure contained shell beads, plain ware sherds, and a faunal bone. Macrobotanical analysis of subfeature fill revealed amaranth, maygrass, globe mallow, and mesquite.

Just inside the east-facing entry was a plaster-lined hearth (Subfeature A.3). Artifacts in the hearth consisted of a shell, a bone awl, and ceramics (plain ware and undifferentiated red-on-buff). Macrobotanical analysis of the fill revealed maize (cob, cupule, embryo, kernel, and shank), as well as seeds of amaranth, tansy mustard, globe mallow, prickly pear, and cholla. It appears that at least one function of the hearth was to prepare food.

On the south half of the structure at approximately 1.5 m southwest of the door was a pit that measured 0.3 m in diameter and approximately 0.3 m deep with burned rodent bone, sherds, and one piece of lithic debitage (Subfeature A.4). Macrobotanical analysis of subfeature fill revealed amaranth, maygrass, globe mallow, and mesquite.

In the northeast quarter of the structure we encountered a hardened, round, clay pedestal built into the surface of the floor (Subfeature A.5). The pedestal was approximately 24 cm in diameter and extended 15 cm above floor level. The pedestal was located near both the entry and the hearth, which should have provided good lighting. West of the clay pedestal was an area

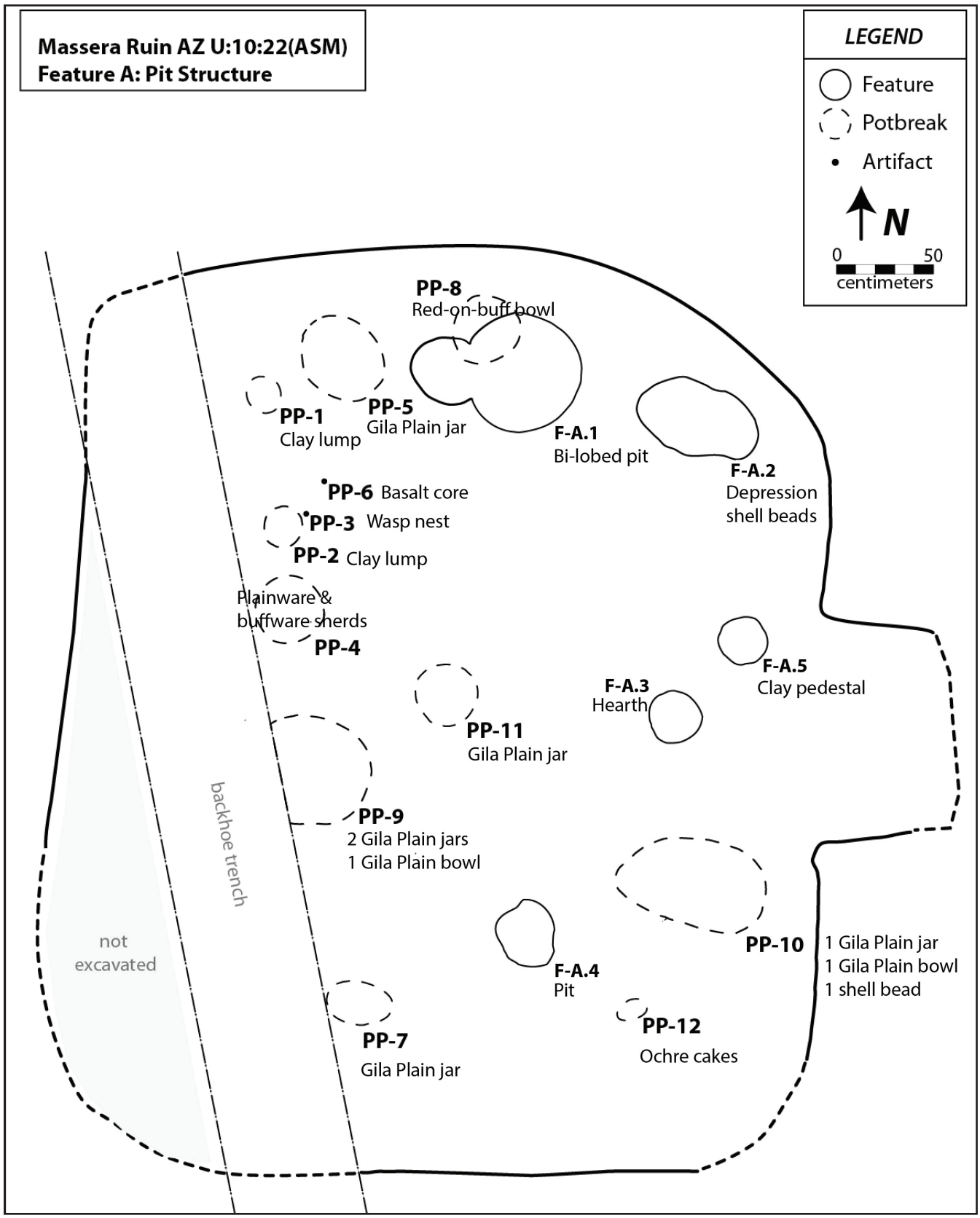

Figure 7. Feature A floor map.

Figure 8. Feature A floor detail showing clay pedestal (Subfeature A.5).

clear of features, which would have provided ample workspace, with easy access to subfloor pits and their contents. We suspect that the clay pedestal could have served as an elevated work surface.

Artifact Assemblage

In addition to the ubiquitous pots, the pit structure contained some flaked stone and ground stone. Throughout the pit structure, but especially in the north half, we encountered cakes of ground and fired ochre, as well as several pieces of worked and unworked schist. It is likely that the schist and ochre were used in ceramic production as tempering and painting ingredients. A summary of the floor assemblage is included in Table 2.

Nine fired vessels were found on the floor, close to the rear wall of the structure. Gila Plain jars were the most common vessel type, followed by Gila Plain bowls, a Santa Cruz Red-on-buff bowl, and a Sacaton Red-on-buff jar. Diagnostic ceramics recovered from the feature fill and floor assemblage suggests the pit structure could have had a long occupation, between Gila Butte through Sacaton phases. However, with no evidence for remodeling, and abundant evidence of plow scars suggesting mixed deposits, the structure was most likely not used for a long duration. Radiocarbon analysis suggests the structure was occupied during the AD 800s or 900s (cal AD 776–971, Beta - 489792) and may have been contemporaneous with the nearby structures F and P, which yielded partially overlapping dates. A clay wasp nest built inside a vessel neck was fired when the structure burned, suggesting the structure had been abandoned for some time prior to burning.

The unfired vessels or raw clay lumps were placed in the northwest corner of the structure. They appear to have been in-process, leather-stage pots, or clay placed in baskets (Figure 9). When the structure burned, these were partially fired. Petrographic analysis of the two artifacts determined that these consisted of a fine, heterogeneous, micaceous clay with few inclusions of quartz, potassium feldspar, plagioclase, muscovite, and chlorite; which suggests a fine alluvial clay possibly obtained from Queen Creek (Ownby 2019).

The highest frequency and diversity of shell artifacts uncovered in this portion of the Massera Ruin were recovered from Feature A and include 17 unworked and worked shell items (e.g., bead, bracelet, and

Table 2. Feature A Floor Assemblage Summary

Point Provenience (PP) Number	Material Class	Description
1	Clay	1 Unfired vessel or raw clay lump
2	Clay	1 Unfired vessel or raw clay lump
3	Clay	1 Burned wasp nest
4	Ceramic	14 plainware and buffware sherds
5	Ceramic	1 whole Gila Plain jar
6	Flaked stone	1 Basalt core
7	Ceramic	1 Gila Plain jar
8	Ceramic	1 Santa Cruz Red-on-buff bowl
9	Ceramic	2 Gila Plain jars and 1 Gila Plain bowl
10	Ceramic	1 Gila Plain jar, 1 Gila Plain bowl, and 1 bead
11	Ceramic	1 Gila Plain jar
12	Mineral	2 Prepared ochre cakes

Figure 9. Unfired vessels or clay placed in baskets (PP-1 and PP-2) found on the floor of Feature A.

Figure 10. Shell artifacts found within Feature A.

pendant fragments; Figure 10). Shell recovered from the fill consists of five beads, two bracelet fragments, a pendant fragment, two "in-progress" beads, and one unworked *Olivella dama* shell. Worked shell recovered from the floor consists of two beads and two unworked specimens.

Abundant minerals were collected from the feature, including tabular pieces of micaceous schist, mica fragments, and a single piece of unworked turquoise (Figure 11). The lithic assemblage in the room included three gravers, two small scrapers, and two metate fragments. No polishing stones or anvils were identified in the assemblage.

DISCUSSION

The evidence that Feature A represents a potter's workshop rests on the analysis of features, particularly the clay pedestal, the presence of two leather-stage unfired clay vessels, and the abundance of temper and paint ingredients (Table 3). Both the micaceous schist and ochre were processed to different degrees and lend evidence that the minerals were used in the production of pottery. It is likely that ceramic vessels were built and painted in the north half of the feature. It is also likely, based on the abundance of worked and unworked shell, that shell jewelry was being produced in the same workspace.

The northern half of the pit structure may be interpreted as a work area, where most pottery-production related material and unfired pots are near each other, with the potter likely working on some parts of production within the pit structure as indicated by the pedestaled clay support near ceramic production materials. Taking the location of the subfeatures and artifacts a step further reveals a possible work area for ceramic production. Unfired vessels were staged towards the back of the structure along with finished vessels, and materials, to be used to towards the front of the structure. This suggests the person working on the platform would need to get access to items in the storage pits as well as have access to light either provided by the doorway or the hearth.

The presence of charred food in the hearth and in some of the floor features indicates that the workshop likely also served as a residential space. The structure may have been used for at least some stages of pottery production. Thus, Feature A may have served a dual function as a residence and craft workshop.

The northern portion of Massera could be

Figure 11. Ochre cakes, tabular pieces of micaceous schist, mica fragments, and an unworked turquoise fragment.

Table 3. Ceramic Crafting Materials in Feature A

Material Class	Description
Clay	Clay Pedestal
Clay	Unfired vessel or raw clay lump
Clay	Unfired vessel or raw clay lump
Mineral	Ochre cakes
Mineral	Tabular schist and mica fragments

representative of founding structures as chronometric dates indicate an earlier occupation than previously documented for the southern portion of the site. The presence of a large, communal-type structure supports this assumption. Most interesting is the first direct evidence for craft specialization documented in Queen Creek. Petrographic analysis conducted as part EPG's excavation project indicates inhabitants of the Massera Ruin exchanged buffware during the late Sedentary period (Ownby 2019). Its location north of Queen Creek was a prime area for the movement of vessels within the greater Gila Basin and possibly to areas along the Salt River. Shell analysis suggests site occupants engaged in long-distance trade or journeyed to acquire marine shell from the Gulf of California, and manufactured shell jewelry at the site.

The authors believe they have found direct evidence of ceramic production in a structure that is characterized by raw materials and a tool kit. The raw materials include processed material (ochre cakes, micaceous schist and mica fragments) and unfired clay lumps. Tools include a platform that may have been used in pottery production. In addition, prepared and unprepared shell fragments and lithics that may represent a shell working toolkit were found within the same structure.

It is also important to note the location of this workshop/residence space in the larger settlement. Rather than being situated in a residential area or courtyard group, it is in a grouping of special-function structures, including a council house and a possible fermentation room. This is the only craft production locus identified at the site. SWCA's excavations in the remainder of the settlement identified a worked sherd and a worked piece of shell but no evidence of craft production. As discussed earlier, other pottery workshops were located close to other specialized structures at the

Snaketown and the Maricopa Road sites.

This discovery of a probable craft production locus at the Massera Ruin provides an example of this rarely documented feature type from Hohokam sites. Petrographic analysis for the two untempered, unfired clay objects indicates that Massera's inhabitants likely participated in the exchange of buffware during the late Sedentary period, including some level of production. Its location north of Queen Creek was a prime area for the movement of vessels through the Phoenix Basin.

Excavation at Massera ruin has demonstrated that a workshop can host two very different types of crafts in the same location. It is not clear whether the crafting was performed by two different specialists using the same workshop, or by a single crafter skilled in two very different crafting traditions. Massera ruin is relatively small in comparison with other villages producing ceramics, and this may have influenced the number of crafters and crafting workshops that the village could support.

The workshop was very near other specialized and administrative structures, suggesting some degree of vertical control over the organization of production. The scale of production appears to have been at the household level and intensity leaning toward more specialized, as there are a fewer range of activities represented in the structure (that is pottery and shell craft production). These parameters, when compared to other sites as having direct evidence of pottery production, are slightly different than other cited examples in the Phoenix Basin.

ENDNOTE

1. We refer to Feature A as a "pit structure" rather than a "pit house" because there is no evidence that it served as a domestic residence.

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A LATE ARCHAIC PERIOD HABITATION SITE IN THE SOUTHERN PART OF THE WESTERN PAPAGUERÍA

Richard Martynec, Richard Davis, and Sandra Martynec

The Black Mountain Project was a research-driven effort attempting to illuminate what occurred prehistorically in the southern part of the Western Papaguería in general, and the Ajo region in particular. The survey phase identified 32 sites: 2 from the Archaic period, 15 from the Ceramic period, 3 that lack temporally diagnostic artifacts, and 12 that contain multiple temporal components. Three of the sites were deemed to be imperiled and were later excavated as the second phase of the Black Mountain Project. The excavations at one of those sites, the Dixie Point site (AZ Z:9:46 [ASM]), revealed an occupation comprised of pit structures and other features, including piles of colored rocks (ocher), and projectile point types dating to the early part of the Late Archaic period; radiocarbon dates support this temporal assignment. These well-dated Late Archaic period pit structures and other features offer unique new information about the timing and types of activities that resulted in the creation of a settlement in this otherwise poorly known region of the Southern Basin and Range Provenance. The successful collaboration between avocational and professional archaeologists discloses a potential resource worthy of consideration for future projects.

Aside from the pioneering work of Ezell (1954), Fontana (1965), and Rankin (1991) the archaeology of the Western Papaguería was not well investigated until the early 2000s. In fact, there were several 15' topographic quadrangles in the region without any sites in the Arizona State Museum records. Much has been accomplished since that time by projects conducted by archaeologists in the northern part of the Western Papaguería on the Barry M. Goldwater Range (BMGR) and the southern part on Cabeza Prieta National Wildlife Refuge (CPNWR); the latter also includes work conducted by the Ajo Chapter of the Arizona Archaeological Society. Whereas the authors are aware of a limited number of projects in the non-riverine expanse of the Eastern Papaguería that have excavated pit structures (for example, Langan 2019; Scantling 1939, 1940; Withers 1941, 1944), to our knowledge the Black Mountain project excavations have unearthed the only pit structures in the Western Papaguería (Figure 1). The structures excavated at the Mobak site were identified as field houses (Bruder and Hill 2008; Hill and Bruder 2000).

The Black Mountain project was a research project conducted by the Ajo Chapter of the Arizona Archaeological Society in two phases, survey and excavation. The area selected for survey was based on land status (public land), known site vandalism, and the environmental setting. Locals made us aware that artifact collection was an ongoing pastime at sites midway between Ajo and Why, Arizona, an area managed by the Bureau of Land Management (BLM). Reconnaissance in the area in 2001 revealed that substantial numbers of artifacts and features were still present. In addition, the local topography offered a compelling reason to select this area as the project domain. There is a large wash, the Rio Cornez that serves as the primary drainage for the broad valley between Black Mountain and the Ajo Mountains. And, the distance from the Rio Cornez to the upper bajada of Black Mountain is only 3.1 kilometers (km). Thus, we were able to examine the entire range of topographic settings, from the lowest bajada or valley floor to the uppermost bajada by covering just 3.1 km (2.5 miles). It was recognized that a survey of this short span would provide an opportunity to determine how people exploited different parts of the bajada and how this changed through time. Cheryl Blanchard, the BLM archaeologist, was contacted and encouraged us to proceed with the survey and issued a permit. For convenience we decided to limit the width of the survey to 1.3 km (1 mile). Survey coverage spacing was 25 m.

Thirty-two sites and 33 isolated occurrences were recorded between 2001 and 2003 during the 766-acre Black Mountain survey (Martynec and Thompson 2005) (Figure 2). Two sites are from the Archaic period, 15 from the Ceramic period, 3 do not contain temporally diagnostic artifacts, and the remainder are multicomponent locations. Criteria based on the quantities and diversities of activities represented by the features and artifacts were used to distinguish sites according to intensity of use. Nineteen are Light Use, 19 are Moderate Use, and four are Heavy Use. The topographic

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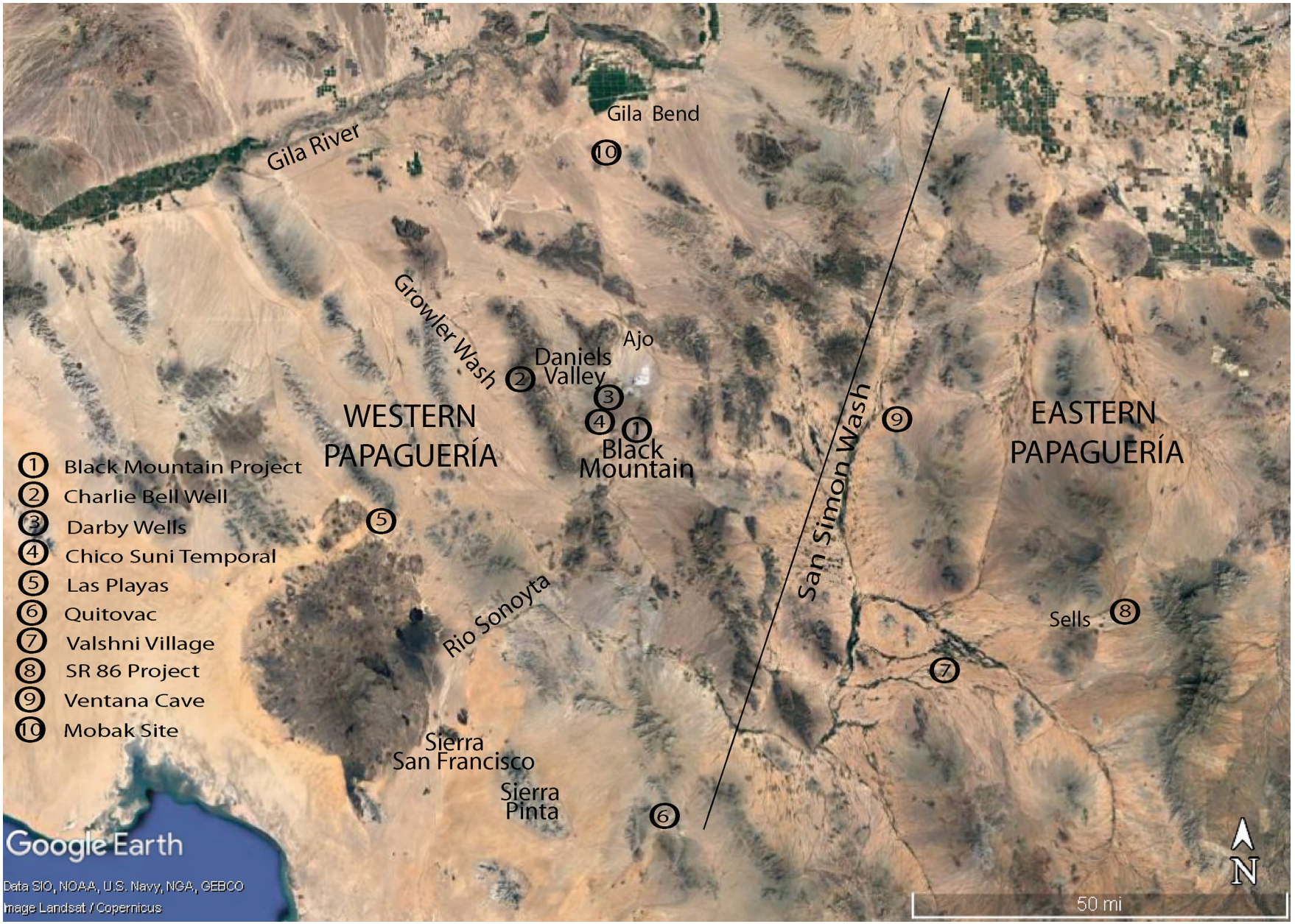

Figure 1. Black Mountain in the western Papaguería.

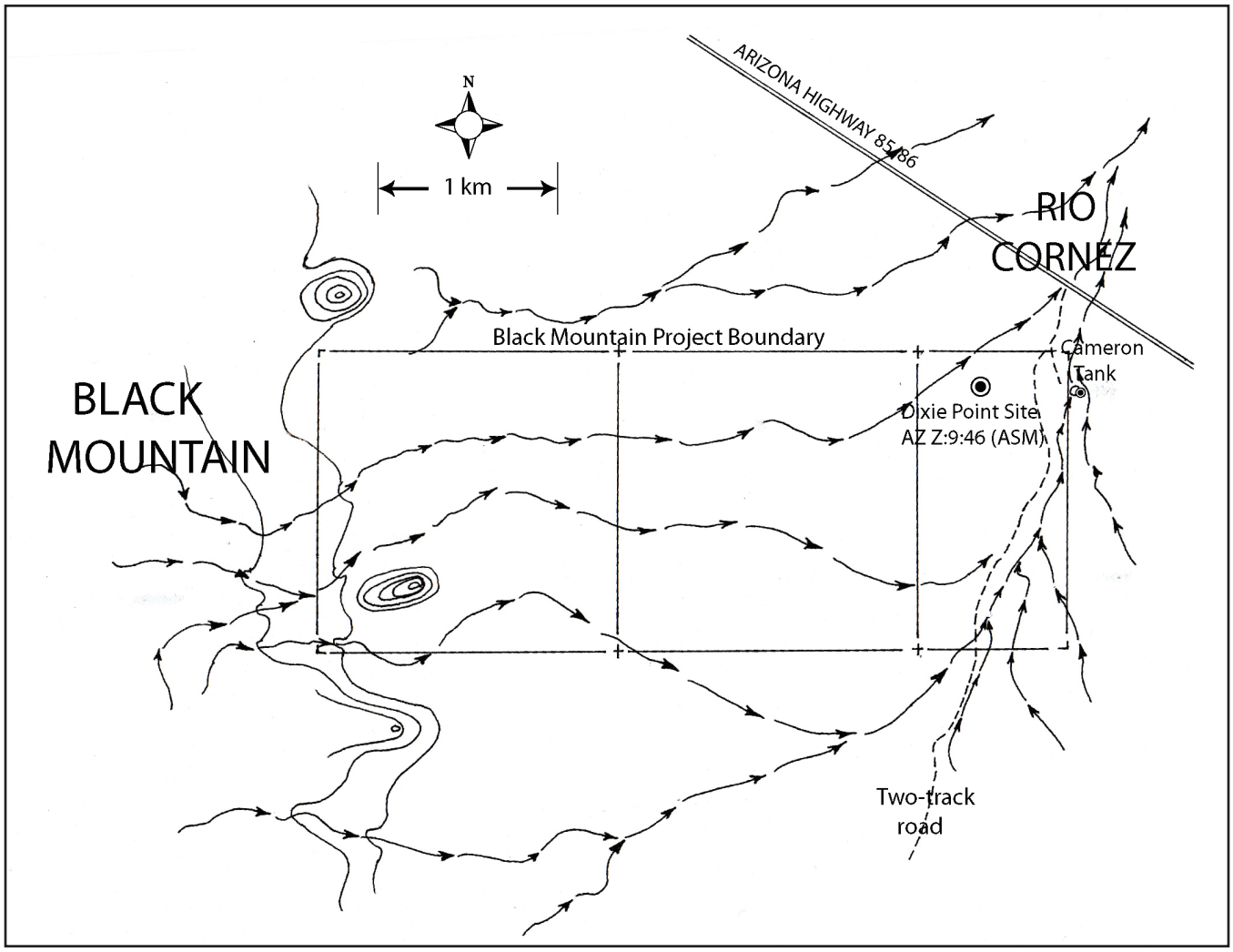

Figure 2. Black Mountain project area.

settings of the Black Mountain sites are as follows: Six of the Light Use sites are on the valley floor, 12 are on the middle bajada, and 1 is on the upper bajada; 6 of the Moderate Use sites are on the valley floor, 2 are on the middle bajada, and 1 is on the upper bajada; and, 2 Heavy Use sites are on the valley floor and 2 on the middle bajada. There does not appear to be a relationship between the ages of sites and their settings.

The survey results raised concerns regarding potential damage to the sites in the future. Therefore, three were selected for excavation during the second phase (2005–2008) of this project: Dixie Point site (AZ Z:9:46 [ASM]), Cameron Tank Village (AZ Z:9:52 [ASM]), and RLD site (AZ Z:9:73 [ASM]) (Martynec et al. 2011). These sites were deemed to be imperiled by severe erosion, cattle grazing, off-road driving and artifact collection. The excavations at the Archaic period component of the Dixie Point site are the focus of this paper.

BACKGROUND

Surface remains of Archaic period sites have been recorded throughout the Western Papaguería. For example, the Daniels Valley survey, which was conducted 18 km west of Black Mountain, identified seven sites with Early, eight sites with Middle, and seven sites with Late Archaic period projectile points (Davis 2005; Martynec and Martynec 2019). Most of the sites are small, probably locations where limited activities occurred, but eight sites have substantial feature and artifact assemblages suggesting more numerous activities. These sites may be base camps.

Charlie Bell Well is in a canyon in the Growler Mountains, which forms the western border of the Daniels Valley. Seven of the 40 Charlie Bell Well sites contain Archaic period artifacts and two might be base camps (Martynec and Martynec 2016). One of the two possible base camps contained a Late Archaic period projectile point and at the other are more than

2,450 petroglyphs. Many of the petroglyphs have been assigned to the Archaic period (Schaafsma 1980).

A Late Archaic period site also was found in the Growler Valley (Martynec and Martynec 2020). At this site two San Pedro projectile points, thermal features, shell, and ground stone were identified. This sizeable site was discovered in blown out sand dunes hinting that additional Archaic remains may be buried in these valleys.

Archaic period sites have been discovered in the Las Playas area 55 km west of Black Mountain (Martynec and Martynec 2011, 2014a). Twenty-three Early, 6 Middle, 17 Late, and 19 untyped Archaic period projectile points were recorded among 159 sites. Many of the projectile points accompany thermal features, chipped and ground stone tools, and shell. With the exception of shell, the Las Playas Archaic period sites appear to be identical to the surface material at the Dixie Point site.

Late Archaic period components have been identified at 50 sites in the eastern portion of BMGR (Heilen and Vanderpot 2013). The Late Archaic period San Pedro phase is defined by stemmed, elongated projectile points with slightly oblique notches and convex or straight bases (San Pedro points); pressure-flaked stone tools; deep, basin-shaped metates; mortars; pestles; and shaped manos. BMGR sites and isolates with Late Archaic period temporal affiliations are in foothill, upper bajada, as well as settings adjacent to streams and stream junctions. Of the 71 calibrated radiocarbon dates (Ahlstrom 2008), only six are from Archaic period contexts.

To date the only structural features excavated on the BMGR are two field houses at the Mobak site located at the north end of the Sauceda Mountains (Bruder and Hill 2008; Hill and Bruder 2000). The site is thought to represent a series of field camps utilized repeatedly for more than 1,000 years. The occupations were likely short term, perhaps seasonal, and involved small groups of people. The Late Archaic period date obtained for one of the field houses of 480 BC–AD 1 is considered unreliable according to Heilen and Vanderpot (2013) whereas the date of AD 677–959 from the other field house is more congruent with the Preclassic period remains at the site. The authors concluded ”during the pre-Classic period, small, mobile non-Hohokam groups resided in the Western Papaguería” (Bruder and Hill 2008:231).

Projects in non-riverine areas within the Eastern Papaguería have encountered nine pithouses at five sites (Langan 2019). This study combined data from the SR 86 projects and Withers (1941, 1944) excavations at Valshni Village and produced an updated regional pithouse typology. The structures examined date to the Late Archaic/Early Agricultural and Early Ceramic periods and “appear to be characterized by low-density, temporary occupation typical of resource procurement and processing loci” (Langan 2019:132). Four of the five sites were repeatedly occupied camp sites as indicated by domestic features, trash mounds, and/or dense and diverse artifact assemblages. These sites likely did not experience year-round occupation, but rather a series of reoccupations over several centuries. The three pithouses at AZ AA:14:39(ASM) are assumed to date to the Archaic/Early Agricultural Period based on the presence of a San Pedro projectile point in one of them, radiocarbon dates taken from nearby pit features, and the proximity and similarity of the three structures (Cook 2014). All are small, having a maximum horizontal dimension of 3.15 m, are either circular or subrectangular, and do not have prepared floors or subfloor pits.

EXCAVATIONS AT THE DIXIE POINT SITE (AZ Z:9:46 [ASM])

The Dixie Point site, which measured 310 × 200 m, was one of the larger sites identified during the Black Mountain project and included three components: Archaic, Ceramic, and Historical (Figure 3). Surface remains indicated that primary use was during the Archaic period, and artifacts consisted of weathered and patinated basalt flakes and numerous flakes of chalcedony, quartz, quartzite, and obsidian. For a discussion of patina and age, the reader is referred to Hayden (1967, 1982), Laylander (1987), Rogers (1966), and Schaefer (2018). Cores are basalt, chalcedony and quartz. Tools are of similar materials and include 5 unifaces, 13 scrapers, 4 bifaces, 1 hammer stone, 1 chopper, and 5 Archaic-type projectile points. Also collected were 6 Olivella shells and 13 pieces of ground stone, including three intact manos. At the southern edge of the site is an artifact concentration composed of historic artifacts.

Due to the absence of surface features as indicators of where to dig, we conducted surface collections of 31 20 × 20 m units during the 2005–2006 field season (Figure 4). The number of artifacts declined abruptly beyond the perimeter of the collection units. Altogether 916 artifacts were collected: 35 ground stone objects, 33 sherds, 4 shell fragments, a projectile point, and 843 chipped stone artifacts. Fire-affected rocks were counted but not collected.

This strategy was based on the assumption that the quantities and types of surface remains are indicators of subsurface deposits. The excavation results support this assumption. All of the sherds, except three, are from the north edge of the collection units, within 10 m of pit structure Feature 8, the only feature at the Dixie Point site dating to the Ceramic period. Two of the four densest surface artifact concentrations were directly above subsurface features discovered during testing (Figure 5).

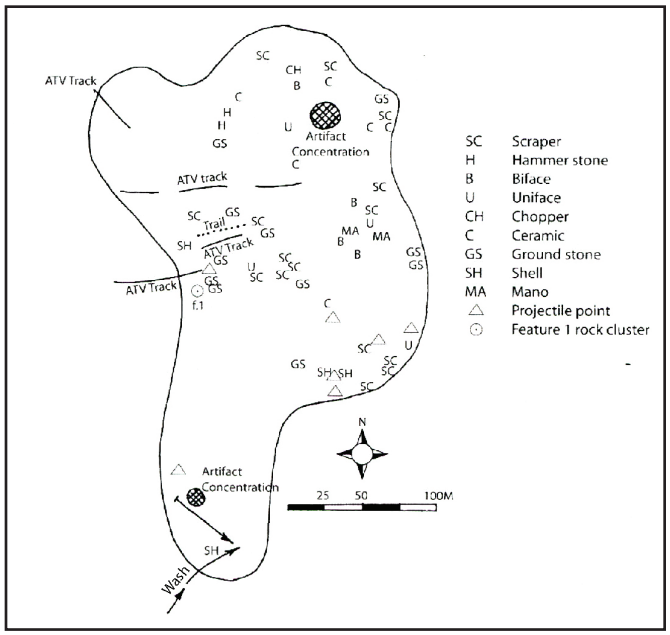

Figure 3. Plan view of the Dixie Point Site.

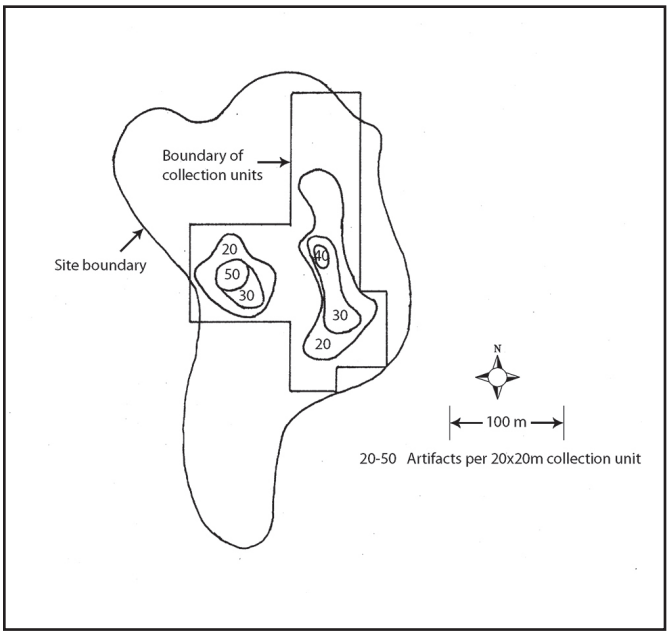

Figure 4. Results of surface collections at Dixie Point Site.

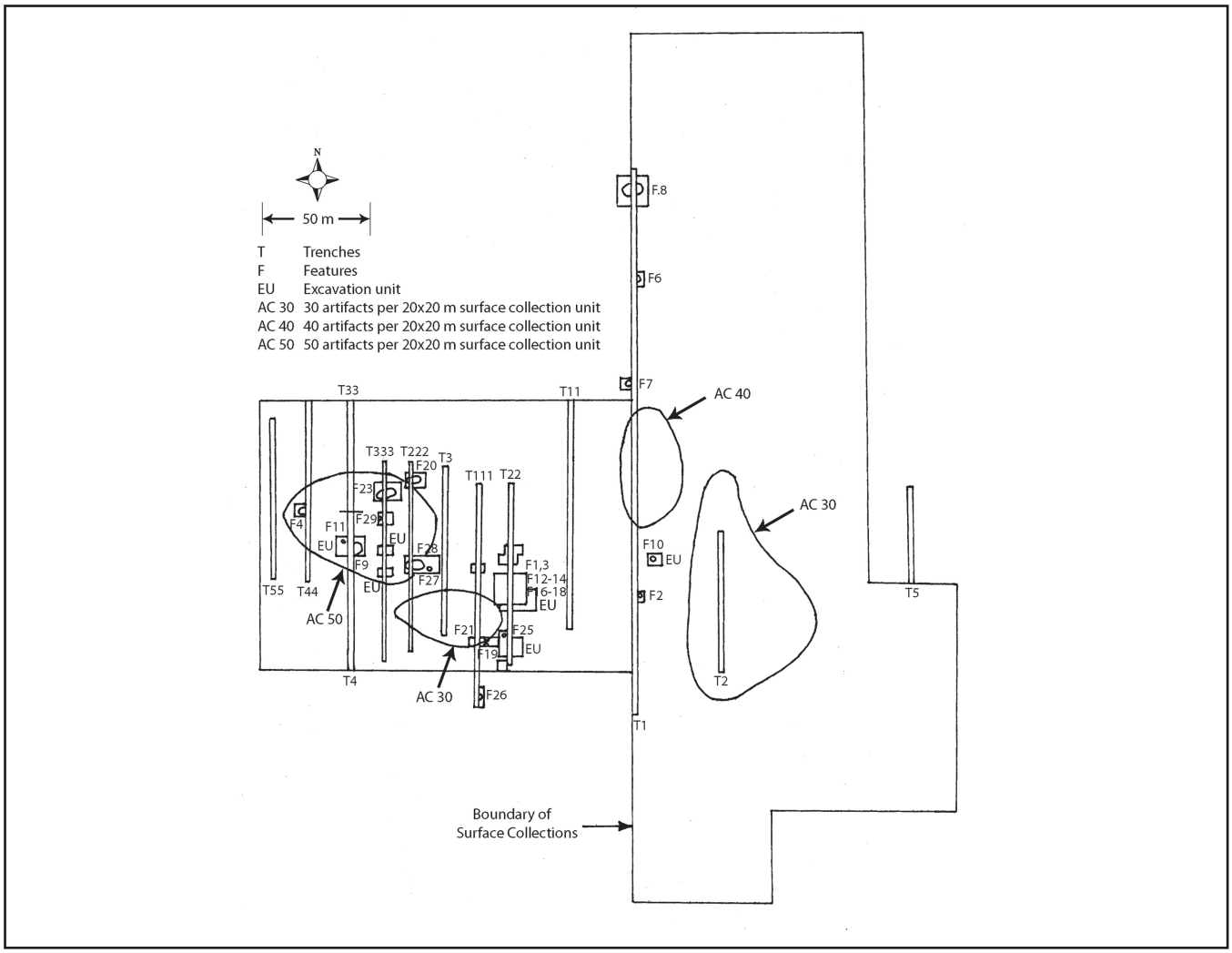

Figure 5. Trenches, excavated units, and features at Dixie Point Site.

Deflation along the eastern edge of the site is offered as an explanation for the absence of subsurface deposits beneath the other two surface artifact concentrations.

For each of the 2005–2006 and 2006–2007 seasons we located five backhoe trenches (Trenches 1–5 for a total of 550 m and 11–55 for a total of 430 m, respectively). Six test units were excavated during those seasons in areas where numerous chipped stone artifacts and fire-affected rocks were noted on the surface, but where subsurface features were not discovered beneath them during trenching. An additional three backhoe trenches (Trenches 111–333 for a total of 300 m) were excavated during the 2007–2008 season (see Figure 5). Trench widths were that of a standard backhoe bucket, about 0.6 m. Depths varied between 1.0 and 1.5 m depending upon the substratum encountered (calciche). Of the 25 features located, there were 3 and possibly 4 pit structures, 10 thermal pits, 4 ash lenses and ash-filled pits, 4 pits of indeterminate function, 1 rock pile, 1 aboriginal surface, and 1 burned surface. The structures recorded at the Dixie Point site are labeled pit structures rather than pithouses because they are houses in pits.

One pollen sample was collected from the floor of pit structure Feature 1, another from the floor of pit structure Feature 9, three from rock-filled thermal pit Feature 17, and a pollen wash was taken from a mano; all were analyzed by the Bilby Research Center, Laboratory of Paleoecology. The analyses identified counts inseparable from pollen rain of today.

A widely adopted convention among archeobotanists is to consider all uncharred seeds in a sample modern, and all carbonized seeds as prehistoric (Hutira 1993). Disappointingly, none of the 19 flotation samples collected during the excavations at the Dixie Point site contained charred seeds.

Feature 1. Pit Structure

Feature 1 was a pit structure that measured 4.3 m northwest–southeast, 3.35 m southwest-northeast and was 10 cm deep (Figure 6). Because of the absence of floor artifacts and evidence of burning, it is thought that Feature 1 was intentionally abandoned. Three postholes and four concentrations of ocher were recorded in Feature 1. One of the piles of ocher was on the floor, one was either on the floor or just above it, and two were on the roof. A rock filled pit (Feature 12), an ash lens (Feature 13), a smaller pit structure (Feature 16), and a thermal feature (Feature 17) intruded into Feature 1. One additional pile of ocher (Feature 14) was found either in the fill, or just outside of Feature 1, which dates to either 2630–2470 or 1300–1020 BC (Table 1).

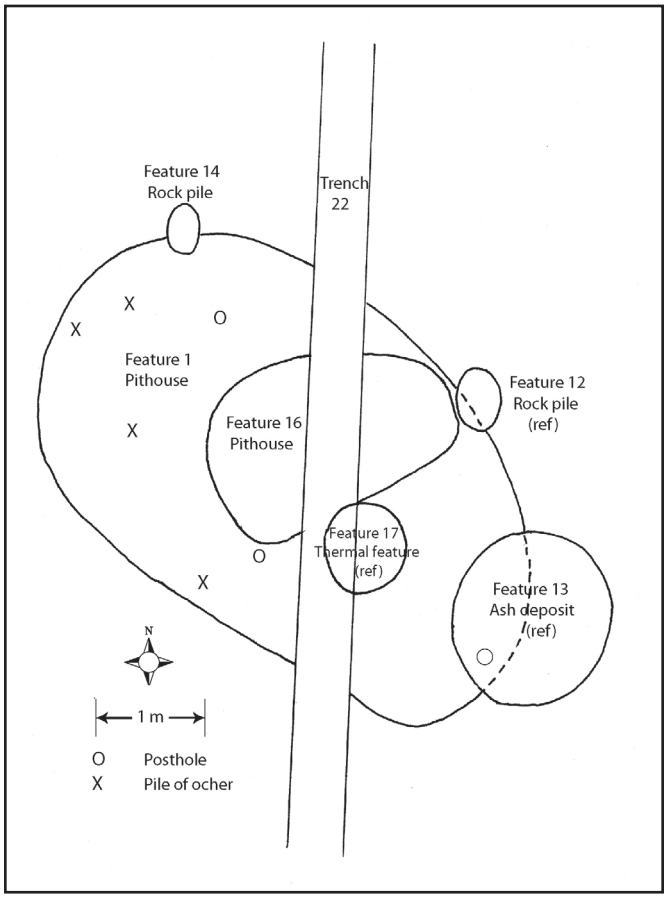

Figure 6. Feature 1 pit structure at Dixie Point Site (Features 12, 13, 16, 17 are intrusive).

Feature 9. Probable Pit Structure

Feature 9 was at least an aboriginal surface, but probably a pit structure. This conclusion is based on the identification of a flat, extremely hard, silt and caliche surface with two well-defined pits excavated into it, Features 9.1 and 9.2.

This feature was first observed as a nearly horizontal lens of ash and charcoal in the east wall of Trench 4. A mano was in the west trench wall, directly opposite the stain. In plan view, the flat surface of this feature was at least 3 m long (north–south) and 2 m wide (east–west). Artifacts were abundant in the fill and the charcoal present permitted the collection of samples for radiocarbon dating. Chipped stone artifacts were most common in the 10–15 cm layer immediately below the current ground surface and continued to the floor, but the frequency decreased with depth.

Features 9.1 and 9.2 were pits excavated into the floor of Feature 9. Feature 9.1 was a thermal pit containing ash and charcoal. In Feature 9.2 were a late Archaic period Cienega-type projectile point (see Figure 8d), ash and charcoal. Flotation and charcoal samples were

Table 1. Radiocarbon Ages on Features from AZ Z:9:46 (ASM) the Dixie Point Site

Lab #	^{14}C yr BP (1 s)[1]	2 s Calibrated Age[2] (probability)	Calibration Dataset	Material	Context
Beta 214449	2970±40	BC 1310–1040	IntCal04	Charred material	Feature 9, pit sructure floor pit
Beta 228438	2940±40	BC 1300–1020	IntCal04	Charred material	Feature 1, pit structure floor
Beta 247927	4000±40	BC 2630–2470	IntCal04	Charred material	Feature 1, pit structure floor
Beta 228440	2690±40	BC 920–800	IntCal04	Charred material	Feature 17, thermal pit
Beta 247928	2720±40	BC 1010–830	IntCal04	Charred material	Feature 16, pit sructure floor
Beta 247929	2870±40	BC 1260–1000	IntCal04	Charred material	Feature 28.1, aboriginal surface pit
Beta 247930	2970±40	BC 1380–1330, 1330–1120	IntCal04	Charred material	Feature 23, aboriginal surface

collected from Feature 9.2; the charcoal produced a radiocarbon date of 1310 to 1040 BC (see Table 1).

Feature 16. Pit Structure

A small pit structure was found intruding through the floor of pit structure Feature 1. The floor of Feature 16 measures a scant 1.8 × 1.2 m in plan (the long axis is east-west). The top of the slightly outward tapering walls measured 2.05 × 1.35 m (Figure 7, see also Figure 6). The floor of pit structure Feature 1 was 2-3 cm above the floor of pit structure Feature 16. A charcoal sample from Feature 16 produced a radiocarbon date of 1010–830 BC (see Table 1).

Four postholes and a pit comprised the floor features of Feature 16. The postholes appeared to follow the perimeter of the west wall and almost certainly there were others on the east side as well. It is unclear what function the pit excavated in the floor served (7 cm deep and 56 × 35 cm wide). The fill in the pit and the postholes was indistinguishable from that just above the floor.

Feature 17 Thermal Pit

This rock-filled thermal pit cut through pit structure Feature 1 (see Figure 6). A charcoal sample from Feature 17 produced a radiocarbon date of 920–800 BC (see Table 1). The obsidian used to make an artifact in Feature 17 originated at Los Vidrios.

Features 20 and 23. Aboriginal Surfaces

Features 20 and 23 were found at the north ends of Trenches 222 and 333, respectively. Based on the termination of ash, charcoal, and artifacts at similar elevations (± 3 cm), we concluded that Features 20 and 23 are aboriginal surfaces, locations where extramural activities occurred. Because of the similar ending elevations, contents, and proximity (less than 10 m apart) it may be that Features 20 and 23 represent a single feature; however, this possibility was not investigated. Both features are irregularly shaped, and the edges were difficult to define because of numerous rodent burrows and root disturbances. A basalt flake in Feature 20 was the only artifact in contact with either surface, and a charcoal sample from Feature 23 produced a date of either 1380–1330 or 1330–1120 BC (see Table 1).

Feature 28 Aboriginal Surface

Based on the number of flat-lying artifacts and flecks of charcoal at 30 cm below the current ground surface and a large pit that originated at that level (Feature 28.1), we have interpreted Feature 28 as an aboriginal surface. The edges of the surface were difficult to define because of numerous rodent burrows and root disturbance—several living creosotebushes had to be removed before excavations could proceed. It is thought that Feature 28 was at least 4 × 4.5 m in plan due to the presence or absence of charcoal and artifacts. There were seventeen fakes collected from the fill above this surface: 11 basalt, 3 chert, 2 obsidian (from the Sauceda Mountains), and 1 of rhyolite. Charcoal samples collected from the fill above this surface were not dated.

Feature 28.1 was a pit on the southern edge of Feature 28. In this round, bowl-shaped pit was somewhat blocky, reddish sandy soil mottled with pockets and patches of ash and charcoal. A basalt flake and charcoal samples were collected from Feature 28.1. The latter produced a date of 1260–1000 BC (see Table 1).

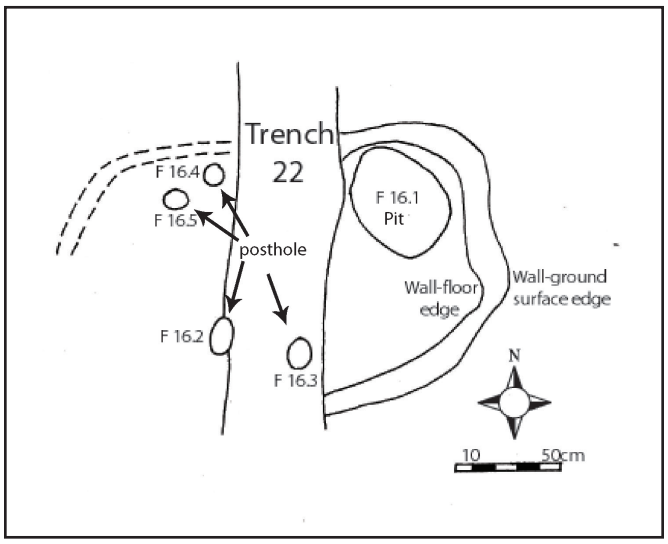

Figure 7. Feature 16 pit structure at Dixie Point Site.

Table 2. Materials Selected for Chipped Stone Tools at Dixie Point Site

Tool Type	Basalt and rhyolite	Chalcedony	Obsidian	Chert	Quartz	Jasper	Total
Projectile point	10	2	5	3	1	–	21
Biface	4	2	–	1	–	–	7
Uniface	2	–	–	1	–	1	4
Scraper	49	1	2	2	1	–	55
Chopper	21	–	–	–	–	–	21
Hammer stone	1	–	–	–	–	–	1
Total	87	5	7	7	2	1	109

ARTIFACTS

Chipped Stone

Chipped stone artifacts (N=1,583) were collected from the Dixie Point site. Basalt and rhyolite account for 91.8% of the assemblage (1,453 pieces). In far lesser quantities, 71 were chalcedony (4.5%), 39 chert (2.5%), 16 quartz (1.0%), 3 obsidian (0.2%), and 1 jasper. These percentages are similar regardless of context, whether surface or subsurface.

Tools included 21 projectile points, 55 scrapers, 7 bifaces, 4 unifaces, 21 choppers, and 1 hammer stone (Table 2). Table 3 provides the material types, time periods, and styles of the projectile points. Several are illustrated in Figure 8.

Ground Stone

There were four manos and fragments of 11 other grinding implements on the surface; most of the fragments were recovered from suspected thermal features where they were probably reused as rocks. The materials used for the tools recovered during excavations are listed in Table 4 and the intact grinding implements from both surface collections and excavations in Table 5. Shell caliche was present on two manos (see Table 5). "Caliche is a white deposit of calcium, magnesium and sodium salts derived from the solution of stones and concentrated on the underside of embedded stones by upward movement of moisture vapor in the soils. It may be laminated and hard (shell caliche), or soft and fluffy, or a faint 'dusting' on the stones, depending upon its age. Caliche is a pluvial deposit that is dissolved when exposed directly to rainfall" (Hayden 1982:581–582). Whereas it is unclear how long it takes for caliche to form a hard shell on a rock or mano, it is thought that it does not occur rapidly.

In summary, a majority of the ground stone artifacts are fragments, and many of these were reused in thermal features. The reused ground stone fragments and intact implements are probably the remnants of tools used locally and produced from Black Mountain basalt. A basalt quarry was discovered immediately northeast of the Black Mountain project area by Hooper (2012).

Because all of the ground stone tools at the Dixie Point site are expedient types, it might follow that formal tool types were not required for the tasks performed by the Archaic-period occupants. The two manos at the bottom of thermal pit Feature 17 imply that they were necessary components of the tool kit used to reduce the resources processed in that feature. The large quantities of fire-affected rocks and ground stone implements found throughout the project area suggest a relationship between the two artifact types may have existed in all time periods.

Shell

Shell artifacts were present but not abundant at the Dixie Point site. Six Olivella beads, an unworked Olivella shell, a small part of an Abalone-like shell, eight pieces of *Laevicardium* sp. shell, a piece of *Glycymeris* sp. shell, and a tiny shell fragment that could not be identified were recovered. Most of the shell at the Dixie Point site was either on the current ground surface, in deposits just below the ground surface, or associated with the late Ceramic period pit structure Feature 8. The exceptions are: a tiny fragment of an abalone-like shell in the fill of pit structure Feature 9; single pieces of a bivalve and Glycymeris, and two pieces of *Laevicardium* sp. in the fill of pit structure Feature 1; and, an Olivella bead and a piece of *Laevicardium* sp. shell in the fill, just above the aboriginal surface Feature 28. None of the

Table 3. Projectile Point Materials, Time Periods, and Styles at Dixie Point Site

Material	Time Period	Style
Chalcedony	Early to Middle Archaic	Pinto
Basalt	Early Archaic	Unknown— heavily patinated
Rhyolite	Middle Archaic	Cortaro
Obsidian	Middle Archaic	Pelona
Obsidian	Middle Archaic	Possible Pelona
Basalt	Middle Archaic	San Jose
Chalcedony	Middle Archaic	Humboldt
Basalt	Middle Archaic	Chiricahua
Rhyolite	Middle Archaic	Humboldt
Basalt	Middle Archaic	Humboldt
Rhyolite	Middle Archaic	Pelona
Rhyolite	Middle Archaic	Pelona
Basalt	Middle Archaic	Pelona
Basalt	Middle Archaic	Humboldt or Pelona
Chert	Middle Archaic	San Jose
Obsidian	Late Archaic	San Pedro
Chert	Late Archaic	Cienega
Chert	Late Archaic	San Pedro
Obsidian	Late Archaic	Unknown
Quartz	Late Archaic	San Pedro
Obsidian	Ceramic	Desert Side Notch

shell at this site can be assigned definitively to the Late Archaic period.

FAUNAL ANALYSIS

Fifteen bones were recovered during excavations at the Dixie Point site: 7 small-size mammal, 3 Artiodactyl, 2 *Lepus californicus*, 1 large-size mammal, 1 medium-size mammal, and 1 small-to-medium-size mammal. A bone from a small-size mammal was on the floor and one from a medium-sized mammal was below the floor of pit structure Feature 9. Three small-size mammal bones were on the floor of pit structure Feature 1. A bone from a large-size mammal was recovered from just below the floor of pit structure Feature 16. None were burned (Arter 2011).

OCHER OR COLORED ROCKS

It is possible that colored rocks collected and stored in pit structure Feature 1 and/or 16 were intended for use as ocher. Thompson (2011) conducted experiments by crushing several of the rocks and adding a binder, which produced remarkable colored stains (Figure 9) (Thompson 2011).

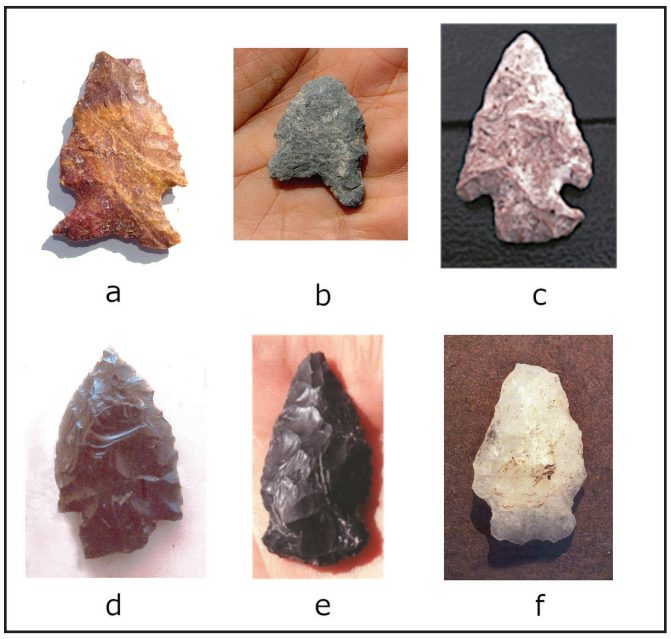

Figure 8. "Projectile points at the Dixie Point Site San Jose (a), Chiricahua (b), Late Archaic (c, d), and San Pedro (e, f).

Tiny (pea-size) to fairly large (fist-size) soft, colored rocks were in the fill, in two piles on the floor, and two piles just above the floor (roof?) of pit structure Feature 1 (Figure 10). Altogether 69 specimen bags containing 292 colored rocks were collected from Features 1, 16, and 17. It is conceivable that prehistoric mixing is responsible for the recovery of colored rocks in the three features of disparate age. If this is the case then it is suggested that original context was in the older pit structures, either Feature 1 or 16. Feature 14, which also contained a seven-colored rock, was encountered while excavating in and around the two pit structures. Notably, colored rocks were found almost exclusively in an area that measures 8 × 9 m in plan.

None of the collected rocks were modified, most were encrusted with caliche, and only upon removal of the caliche could color be detected. Roughly, the rock colors were categorized as red, brown, lime green, blue gray, and white.

The large quantity of rocks (measured in kilograms) is intriguing. If they were intended for use as ocher, one wonders if they were all for personal consumption? Might some have been intended for export?

DISCUSSION

Archaeology of the Papaguería is poorly understood, the west more so than the east, and the southwestern part least of all. Excavations in the later are limited to the one under discussion and that of a Ceramic period feature containing cremated animal remains (Martynec

Table 4. Ground Stone Artifact Types by Material Types from Excavations at Dixie Point Site

Tool type	Fine-grain basalt	Medium-grain basalt	Vesicular basalt	Granite	Other	Unknown	Total
Metate	14		6	3			23
Mano	5		6	2	1 quartzite, 1 rhyolite		15
Hand stone	4	1			1 quartz	2	8
Nether stone	1			4		1	6
Fragment	6		3	5	1 rhyolite	2	17
Total	30	1	15	14	4	5	69

Table 5. Intact Manos at Dixie Point Site

Material	Context	Comments
Vesicular basalt	Feature 17	Small
Vesicular basalt	Feature 17	Small
Vesicular basalt	Back dirt, Trench 22	13×7×4.5 cm, loaf-shaped, bifacial use, shell caliche on working surface
Rhyolite	Feature 9	15×10.5×5 cm, light use, expedient, one end battered, shell caliche on working surface
Granite	surface	10×11×5 cm, expedient, bifacial use, one end battered
Vesicular basalt	surface	14×10×6 cm, bifacial use, reused as a hammer stone
Vesicular basalt	surface	12×12×6 cm, bifacial use, one end battered
Fine-grain basalt	surface	12.5×11×8 cm, unifacial use

and Martynec 2014b). Data from surveys are far more abundant and also useful in determining where people chose to spend time, when this occurred, and the strategies they employed. However, the discovery and excavations of several Late Archaic period pit structures are, to our knowledge, the only ones conducted in the Western Papaguería.

When was the Dixie Point Site Occupied?

The principal occupation of Dixie Point site is from the Late Archaic period, although an AD 1420–1660 pit structure also was excavated at this site. And whereas the Late Archaic period occupations of this site are well documented, the projectile point types from surface collections indicate that people visited the area during the Early and Middle Archaic periods as well.

Altogether, seven dates were obtained during the excavations and all, but one, were between 1380 and 800 BC (see Table 1). A suspected anomalous date of 2630–2470 BC was acquired from pit structure Feature 1, but it also produced a more congruent date of 1300–1020 BC; both dates were obtained from charred material. It is certain that the area in which the pit structures and other features were found was used repeatedly as evidenced by superimposition and the dates obtained from those features. The stratigraphic positions of the features and a set of similar dates suggest that the most intensive activity at the Dixie Point site occurred between 1300 and 1200 BC. Two Late Archaic period projectile points recovered during excavations support those dates.

Why Was This Location Selected?

Water, vegetal resources, hunting opportunities, and probably ocher are available in this area and all were exploited by the occupants of the Dixie Point site.

Water

We suspect that water was obtainable at certain times of the year in tinajas based on the Dixie Point site's location within the Rio Cornez watershed and because the Cameron ranching family constructed a water basin a scant 100 m east of the site, an ideal location to capture runoff concentrations near the site. The authors have observed that Ajo ranchers often (always?) constructed water basins at favorable drainage features and where Native American sites are present.

Vegetation

Data for reconstruction of the climate in the Western Papaguería is sparse (Antevs 1948, 1955; Betancourt et al. 1990; Martin 1963; Van Devender 1987, 1990). Of the two areas of the Western Papaguería where pack rat middens have yielded information (Puerto Blanco Mountains and Tinajas Altas Mountains), only the Puerto Blanco Mountains included vegetation dating between 2000 BC and AD 1. Foothill paloverde, ironwood, Mexican jumping bean, and organ pipe cactus were abundant in middens in the Puerto Blanco Mountains at this time, implying an increasingly dry climate (Van Devender 1987). Even though records suggest temporal and spatial variability in climate, by the beginning of the late Holocene, the modern climatic regime was established. It is also thought that the Late Archaic and some of the Ceramic periods may have been wetter and cooler than today (Dean 1988; Ely et al. 1993; Graumlich 1993; Graybill 1989; Hall 2018; LaMarche 1974; Mabry 1998a; Rose 1994).

Figure 9. Stains produced from ocher at Dixie Point Site.

Figure 10. Ocher at Dixie Point Site.

Today the trees and shrubs in the Black Mountain project area are creosotebush (which is predominant), bursage, velvet mesquite, blue paloverde, and occasional ironwood. The trees are primarily along the numerous drainage channels created when rains rush down the slopes of Black Mountain into the Rio Cornez. Currently the expanse between the Río Cornez and Black Mountain has been reduced to creosote flats by grazing cattle, and cactus can be found only on the upper bajada. However, this leased BLM land must have had sufficient resources to raise livestock in the early 1900s because the Cameron family decided that the effort required to construct a water basin was warranted. In support of the contention that the vegetation was dramatically different prior to the introduction of cattle are the numerous chipped and ground stone tools, sherds, and concentrations of fire-affected rocks, not only at the Dixie Point site, but at the 31 other, younger sites found nearby. The distance from the floodplain of the Rio Cornez to the upper bajada of Black Mountain is 3.1 km, and traces of suspected residual vegetation still observable are saguaro, cholla, pricklypear, and other types of cactus. A variety of bushes and possibly ephemerals were almost certainly present, as well.

The number of grinding implements discovered during survey, surface collections, and excavations illustrate the importance of plants and seeds at many of the sites in the project area, including the Dixie Point site where 8 intact manos and 61 fragments of metates, manos, hand stones, and nether stones were recovered. Many of those fragments were located in subsurface deposits that probably date to the Archaic period.

The presence of so many thermal features and ground stone probably implies plant reduction. It is acknowledged that some of the thermal features may represent loci for comfort heating or processing animal resources; however, the substantial ground stone assemblage suggests otherwise. If this is correct, it might follow that occupation occurred between the late spring and early fall as resources became available. It is unfortunate that the pollen and flotation analyses were not productive.

Is it possible that limited agriculture was conducted by the occupants of the Black Mountain sites? Perhaps. We are aware that floodwater or ak-chin farming was performed nearby at the Hia c-ed O'odham villages and temporals (ak-chin farming field locations) of Darby Wells (Eiler, personal communication 2010) and Chico Suni (Fontana 1965). Doyel and Eiler (2003) have identified additional Hia C-ed O'odham farming sites in the Western Papaguería.

Hunting

Animals were surely attracted to the vegetation along the Río Cornez and its tributaries. And there is evidence that Dixie Point site hunters were aware of them. The evidence includes 15 animal bones, 21 projectile points, 55 scrapers, 7 bifaces, 4 unifaces, and 21 choppers. Bones from Artiodactyls, rabbits, and small- and medium-size mammals were recovered during excavations; none were burned (Arter 2011).

Ocher

People became aware of the properties of various natural resources and applied them in a variety of ways to suit their needs. Ocher was likely used for body decoration during life and Miller (1980) noted that, worldwide, the abundance of ocher is generally higher at prehistoric sites with evidence of other forms of personal decoration, such as beads and pendants. For example, during the Ceramic period the Hohokam at Snaketown "prepared red pigments made by grinding hematite and mixing the powder with clay or other substances and shaping the mass into loaf-like lumps" (Haury 1976:276). And, "painting articles of wood, woven materials such as baskets and cloth, and the human body can be inferred" (Haury 1976:356).

Colored rocks or ocher was encountered in Archaic and Ceramic period contexts at Ventana Cave (Haury 1950). Red paint was evident on numerous metates created by pulverizing pigment, presumably for rock painting; a schist slab or palette exhibits red or black stains and worn surfaces from pulverizing paint materials; and, there is a painted design on a pipe. Color producing minerals such as specularite for red paint was in upper Levels 1–5 (AD 1± to present), a few red and black hematite specimens were also in the upper levels, a painted pelvis of a cottontail with black and red zigzag lines was in Level 1 of the lower cave, and a painted wooden disc was identified near the current ground surface of the upper cave. Haury (1976) speculates that the pictographs in both caves were produced by Papagos (O'odham). Historical use of ocher by O'odham was also noted by Russell (1908:93) "of mineral products they brought red and yellow ochers for face and body paint, and the buff beloved by Pima weavers."

A burial exposed by erosion at Tinajas de los Papagos contained a prone individual with the body painted red and a slab metate with the grinding surface covered with red pigment was inverted over the pelvis (Hayden 1967). The feature produced a date of 20 BC ± 110.

The application of ocher to bodies prior to primary burial and to the bones of secondary burials was a common practice in contemporaneous early agricultural communities in southern Arizona (Mabry 2005) and

northwestern Sonora (Watson 2011). The inclusion of ocher as grave offerings and objects used in ritual deposits at those early agricultural settlements were also common (Mabry 1998b).

Mineral resources that might have been exploited in the O'odham region include ocher. We know that they made long-distance trips to procure it for use as a mineral pigment (Heilen and Vanderpot 2013). According to Ives (1989), the O'odham traveled to the Sierra San Francisco and Sierra Pinta (Mexico), south and east of the Río Sonoyta, to mine limonite (yellow ocher) and hematite (red ocher).

It is conceivable that the area in and around the Ajo copper mine was, and still is, a source of ocher. "Copper ore in Ajo may have been mined by American Indians from time immemorial" (Broyles and Rutman 2018:6). Aside from the colored rocks found in the Late Archaic-period pit structures at the Dixie Point site, there are artists in Ajo who are today using the local minerals mixed with binder to create paintings. And, there is a persistent rumor that colored rocks in the area gave the town of Ajo its name. This rumor is somewhat suspect because the word *ajo* in Spanish refers to garlic, and there is no similar O'odham word according to Harry Winters, Jr., (personal communication 2021). However, Samuel Fayaunt, a cultural resource specialist for the Tohono O'odham observed (personal Communication 2021) that Au'auho sounds like Aw, Aw-a-ho, which means to paint or draw something.

There were 292 unmodified colored rocks or ocher in one or two of the Late Archaic-period pit structures at the Dixie Point site and areas adjacent to the pit structures. These rocks were piled on both the pit structure floor and roof. The intended purpose of this ocher is a mystery but may have served a variety of functions involving personal adornment, decoration of favored objects, and for ceremonies. The sheer quantity of stored material in this pit structure (several kilograms), though, implies value. So, it is conceivable that some was for export.

Structural Characteristics

Because only three pit structures were discovered at the Dixie Point site, and one is uncertain, conclusions regarding structural characteristics for Late Archaic-period pit structures in the southern part of the Western Papaguería are limited. All three are quite variable: an oval-shaped structure 4.3 × 3.35 m in plan (Feature 1); an indeterminate-shaped, probable pit structure more than 3 × 2 m in plan (Feature 9); and a subrectangular pit structure spanning 1.8 × 1.2 m (Feature 16). Entries, hearths, and floor preparations were not observed. The absence of evidence of burning and the occurrence of only a few chipped stone artifacts suggest that the pit structures at this site were intentionally abandoned. Except for being slightly larger than those described by Langan (2019), these structures are remarkably similar to them. But, one wonders if these types of temporary structures should be expected in similar settings, under similar circumstances, regardless of age?

Nature of the Occupation

There is no evidence that Late Archaic period utilization of the Dixie Point site was permanent, extensive, or for protracted lengths of time. Rather, usage was most likely seasonal, perhaps late spring through early fall when local resources supported small groups of people, perhaps as a base camp.

The possibility that knowledge by Native American populations of this location along the Río Cornez persisted during the Late Archaic period is intriguing. An argument can be made for just such an occurrence if one considers the multiple house-building episodes and excavations of pit features represented by the superimposition of Features 1, 12, 13, 14, 16, and 17 at Dixie Point site. The reuse of ground stone artifacts as rocks in roasting pits and other features supports this argument.

CONCLUSIONS

Excavations at the Dixie Point site provide a glimpse into the strategies employed by a few Late Archaic-period individuals in the Western Papaguería. The hunter-gatherers of that era and area were probably highly mobile, small groups, possibly composed of single families or perhaps extended families. The archaeological evidence from the Dixie Point site supports this assertion.

The instances of superimposed features of varying ages (1380–800 BC) indicate repeated use of this area over a long period of time possibly implying that their seasonal rounds were at least somewhat regular and controlled. If that was the case, then the site could represent a reoccupied base camp for foragers who were continuing an Archaic lifeway in southwestern Arizona during an interval when foragers with less mobility were practicing low-level food production with maize in southeastern Arizona (Vint 2018) and northwestern Sonora (Carpenter et al. 2018; Pailes 2017).

The presence of two and probably three pit structures at the Dixie Point site imply the necessity of constructing temporary shelters and the accompanying artifacts suggest that vegetal and animal resources were targeted. The ocher found on the floor and roof of one of the pit structures warrants future study. The identity of the people who occupied the site cannot be determined with the evidence at hand, but the surface

remains at this site are identical to those at other sites in the southern part of the Western Papaguería stretching from Black Mountain westward through the Daniels and Growler Valleys to at least Las Playas 55 km to the west.

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BOOK REVIEW

TEWA WORLDS: AN ARCHAEOLOGICAL HISTORY OF BEING AND BECOMING IN THE PUEBLO SOUTHWEST

by Samuel Duwe, 304 pp., preface, index, maps and illustrations. The University of Arizona Press, 2020, $60.00 (Cloth).
ISBN: 9780816540808

Duwe prefaces his book about Tewa worlds by recognizing that there is no singular description of Tewa worlds, acknowledging that it is a multi-layered mosaic. He admits to his place outside that world in writing such a text. He does not claim to be an authoritative voice on the matter. It is with these acknowledgments in mind that Duwe immediately lays out that this text is also up for the reader's interpretation, and provides insight not only from archaeological and ethnographic record, but also from the living Tewa peoples. He recognizes that both traditional and archaeological knowledge claims can contribute toward a "broader perspective of Tewa history".

Before discussing the history of the Tewa, whether ethnographic or archaeological, Duwe presents a summary of a cultural and artistic installation outside the National Museum of the American Indian. Entitled *Always Becoming*, by Santa Clara Tewa artist Nora Naranjo Morse, the installation goes through stages of creation and decay. Duwe uses this cycle as an analogy to clearly indicate that Tewa culture is not static, and that Tewa culture is a constant negotiation of the Tewa people with principles of renewal and stewardship, in the process of becoming. Before specifically discussing the Tewa, Duwe reminds us briefly of the Pueblos' history and their varying interactions with Spanish and American colonialization, anthropology, and archaeology, to highlight the differences between the Pueblos. Duwe reminds us that as similar as the Pueblos may seem, they are not a singular unified cultural sphere.

In Chapter 2, Duwe discusses Tewa cosmology, social structure, and oral traditions. Duwe sets up the coming archaeological discussion by first sharing the shape of the Tewa world in recent times. This is integral, because as Duwe states, to understand Tewa history is to "embrace both continuity and change, being and becoming". By listing some of the more prominent works in Tewa ethnography, Duwe illustrates how great the interest in Tewa has been and continues to be. This interest caused such an invasion of 'researchers' to the Pueblos, many with questionable methods and results, causing distrust of anthropologists/archaeologists that prevailed in the 20th century and lingers today. Yet Duwe's point is not to demonize the field he is in but to portray truths of the history of research, causing him to preface with his own position in discussing Tewa worlds. Nonetheless, despite his place as a spectator into a Tewa world, Duwe discusses the emergence and organization of Tewa, heavily relying on famed Pueblo scholar, Alfonso Ortiz.

In the third and fourth chapters Duwe discusses the history of archaeological work in the region going back more than a century. While archaeologists may rely on cultural material to discuss the emergence, occupation, and interactions of the Tewa throughout time, it is not likely to know the full story of who the Tewa were and continue to be, without incorporating Tewa philosophies and other ways of knowing. Nonetheless, Duwe claims archaeology of the region, particularly on the Rio Chama, helps to indicate the cultural differences among delineated 'districts' across the Tewa world, showing the relationship between varying Tewa emergence traditions and the archaeological record. Duwe also stresses that Tewa historical knowledge is in itself another line of evidence to such archaeological 'truths' observed in settlement patterns. Embracing traditions from places like Ohkay Owingeh, Duwe shows that archaeology and other ways of knowing, such as oral histories, can fuse to form other ways of interpretation, and stresses that even with such fusions, there can still be more than one interpretation. Generally, archaeologists seek single truths in material culture, while the Tewa stories may offer many truths of a given event. Duwe believes that the archaeological record of the Rio Chama Valley supports long held Tewa oral traditions such as the existence of a Summer and Winter people, who eventually merge into a singular tradition while maintaining inherent cultural dualities. This duality, as Duwe points out, is important in Tewa peoples' understanding of how they came to be, a merging of two different people, with neither half, Winter or Summer, being more important than the next.

In Chapter 5 Duwe discusses the ethnogenesis of Tewa, the coming together of disparate peoples to find a central place to create a new type of life, reflected in both Pueblo tradition and the material record, while in Chapter 6 Duwe discusses the coming of the Spanish in the colonial era. Chapter 5 may be the heaviest in terms of archaeological jargon, especially as it relates to ceramic assemblages. This chapter may be the cause for certain reviews of Duwe's book, as one reviewer claimed on Good Reads (goodreads.com), it is "hard to give this book a reading since it's really written for archaeologists and not for people like me." Fortunately, this chapter eventually breaks away from drowning in ceramic typologies to discuss the building of shrines and emergence of a Tewa cosmos. Duwe successfully helps the reader recognize that understanding the importance of these shrines, and their alignment and location, is to have some knowledge of how the Tewa perceived their place in the cosmos and perhaps why they chose certain places to settle. Chapter 6 succinctly describes the interactions of the colonial era. In discussing the questionable "warm welcome" of the Spanish to the choice of "abandonment", Duwe displays changing perceptions and interpretations of both ethnographic and archaeological records. What Duwe makes clear, mentioned in both the introductory chapter and in Chapter 6, is that Spanish colonial interaction would change who the Tewa are. However, Duwe makes it clear that despite any disruptions to a Tewa way of life, colonialism did not cause any abandonment of places or ways of being. The Tewa, Duwe mentions, still practice similar patterns of land use as they did before, and the places the Tewa once lived are not abandoned, for they continue to exist, and remain occupied, in their hearts, memories, stories, and songs.

The final chapter carries on the notion that anthropology and archaeology can be, in themselves, colonizing forces in interpreting and presenting the lifeways and existence of a people, the Tewa, without actual Tewa inclusion. Duwe makes sure to point out that his own perspective on Tewa, past and present, draws from Pueblo scholars and artists who discuss Puebloan "history, philosophy, ontology, cosmology, and epistemology". Duwe places himself in the category of archaeologists who need interaction with such Puebloan concepts in order to challenge their own inherent Western biases and assumptions. Duwe succeeds in Tewa Worlds to indicate that archaeology, anthropology, nor ethnography can ever be exact truths, and that the perspectives of the people, in this case the Tewa, can be of great complement to such interpretations. As a non-American with just an introductory insight into the Southwest and Puebloan life, Duwe's book is a great addition to comprehensive literature on the subject. The method of writing and interpreting, with perhaps the exception of portions of Chapter 5, provide great hope that archaeologically related texts will, in future, not only consider other ways of knowing, but also consider non-archaeological citizens as part of their audience.

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