Early Agricultural Period Cerros de Trincheras on the Upper Gila River, Southeastern Arizona

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The Round Mountain, (AZ CC:4:61 (ASM)) and DotMon sites (AZ CC:4:62 (ASM)), located in the Upper Gila River in southeastern Arizona's Duncan-York Valley extend the known range of Early Agricultural period cerros de trincheras into a third major river valley, suggesting that these early, dramatic locations are a feature of the beginnings of farming in Northwest Mexico and the American Southwest (NW/SW). The goal of this paper is to summarize our field work at these two sites with emphasis on the surface observations, dating, and botanical samples. Cerros de trincheras are remarkable locations as they represent places where groups invested heavily in modifying the landscape by constructing networks of walls, terraces, houses and other features on isolated volcanic hills at multiple points in time (Fish et al. 2007; Hard and Roney 2020; Stacy 1974). While Late Prehistoric period cerros de trincheras are best known (McGuire and Villalpando 2007), our work at Cerro Juanaqueña and related sites in the Río Casas Grandes and research at Tumamoc Hill along the Santa Cruz River in the Tucson Basin showed that cerros de trincheras were also constructed during the San Pedro (3450 to 2750 cal BP) and Cienega phases (2750 to 1900 cal BP) of the Early Agricultural period (Fish et al. 2013; Hard and Roney 2020:7-8). The Early Agricultural period dates from 4150 to 1900 cal BP, that is from the arrival of maize into the NW/SW until the emergence of a functional ceramic technology.

A range of functional interpretations including defense, monumental construction, social and symbolic roles have been offered for cerros de trincheras and many have evidence of a residential function in the form of domestic features and related artifacts (Fish et al. 2007; Hard and Roney 2020:146-150; Haury 1962; Wilcox 1979). Existing literature argues that multiple Early Agricultural period cerros de trincheras including Cerro Juanaqueña and related Rio Casas Grandes sites, Round Mountain, and the Sanchez site located in the Safford Valley were

defensive locations (Hard and Roney 2020, 2023; Whisenhunt 2020). In addition to being built on hilltops, evidence consistent with a defensive function include perimeter walls or berms, rapid construction, multiple concentric walls that provide a layered defense, a 360 degree orientation, and cross-cultural data (Hard and Roney 2020:155-159). Late cerros de trincheras are recognized also as places of social integration and we have identified plazas is association with early cerros de trincheras (Fish et al. 2007; Hard and Roney 2023; Hard et al. 2023).

The Duncan Valley of the Upper Gila River is in the northern portion of the Basin and Range physiographic province as it transitions into the Mogollon Highlands (Figure 1). The Peloncillo Mountains lie to the west and south of the valley and the landscape is characterized by arid ridges, hills and arroyos. The Duncan Valley bottom ranges from 1100 to 1075 m in elevation with riparian vegetation. Beyond the narrow riverine corridor, at low elevations, the biotic community is Chihuahuan Desertscrub (Brown 1982; Brown and Lowe 1983). Within 50 km to the north, and with increasing elevation, biotic communities rapidly change to grasslands, woodlands, and forests.

[Figure 1 about here]

Duncan, Arizona receives an average annual precipitation of 25.6 cm with about half falling July to September (National Oceanic and Atmospheric Administration 1982). Rainfall during the 170 day frost-free growing season, May 2 to October 20 is 16.7 cm, barely sufficient in an average year to meet maize's minimum growing season requirement of 15 cm (Whisenhunt 2020). Today arable land is restricted to intermittently wide floodplain parcels along the narrow channel.

Prior to our own investigations archaeological work in the Duncan Valley has been limited (Berman 1978; Lascaux and Montgomery 2013; Lightfoot 1984). The Duncan-York

Valley lies on the western edge of the Mimbres-Mogollon cultural tradition and multiple regional summaries are available (Anyon et al. 2017; Roth et al. 2018; Whisenhunt 2020). The cultural-historical framework for our project is the Early Agricultural period originally defined for southeastern Arizona and applied to large portions of the Basin and Range of the NW/SW (Hard and Roney 2023; Huckell 1995; Mabry 2008; Turnbow et al. 2018).

Round Mountain was constructed on a 205 m volcanic peak overlooking a conspicuous river reach boundary that creates both a fertile floodplain and reliable surface flows that modern farmers recognize as dependable when other stretches run dry. The boundary is formed by both a geological constriction and a tributary that force subsurface flow to the surface and allows floodwaters to spread and deposit alluvium (Nials et al. 2011; Whisenhunt 2020:53).

The inhabitants of Round Mountain built a total of 1.9 km of walls and terraces in a series of concentric bands that encircled 17 rock ring features above this superior farming location. The site is 6 hectares in size and is situated on lands administered by the Bureau of Land Management. The thin, rocky soils support low shrubs, particularly mesquite and creosotebush, along with scattered annuals and grasses, creating excellent archaeological ground visibility. Radiocarbon samples date the occupation to between 2750 to 1900 BP, and place the site in the Late Cienega phase of the Early Agricultural period. A limited secondary, Late Pithouse period (A.D. 550-1000) use occurred based on the presence of ceramics.

The DotMon site is a smaller Early Agriculture period cerro de trincheras also on BLM land, located about 10 kilometers south of Round Mountain. It is on the northern crest of an isolated, 400 m long, volcanic ridge that rises 122 m above the Gila River. Scattered mesquite shrubs and moderately dense grasses are present. An Arizona Department of Transportation survey monument on the site is the basis for the site name. Constructed walls at this site total about 250 meters in length, and the complex includes seven rock rings, some of which are the foundations of habitation

structures. A single test unit was excavated in one rock ring that yielded a charred piece of oak wood but it unfortunately produced a modern date suggesting this feature had been disturbed in recent times. Based on material culture, including projectile point forms, and the virtual absence of ceramics the site is roughly contemporaneous with Round Mountain.

Methods

Guided by an interest in Early Agricultural period settlements, cerros de trincheras, and settlement patterns more generally, we conducted archaeological field work at Round Mountain and the DotMon site over the course of three field seasons operating May to June of 2014, 2015, and 2016. The field work was conducted as a University of Texas as San Antonio research and student field training effort with the support of Colinas Cultural Resource Consulting in Albuquerque. Although this chapter focuses on our work at Round Mountain and the DotMon site these field operations also involved extensive survey of Duncan-York valley in southeastern Arizona as well as excavations at the Duncan Donut (AZ CC:4:63 (ASM)), Coati (CC 4:68 (ASM)), and Two-Boots (AZ CC:4:32 (ASM)) sites in that valley (Roney et al. 2015; Roney et al. 2016; Whisenhunt 2020). Further afield, work was also conducted in the eastern Safford Valley at the Sanchez cerro de trincheras (AZ CC:2:452 (ASM)) (Carpenter and Hard 2019; Hard et al. 2023; Wall et al. 2019). Other cerros de trincheras in the Upper Gila River include the North Site and Canador Peak as well as a number of small hilltop sites each with few features (Roney 1999; Whisenhunt 2020).

Using Google Earth, Andy Laurenzi of Desert Archaeology identified Round Mountain and soon after John Roney discovered DotMon. Our work on these two sites was conducted under permits from the Safford Office of the Bureau of Land Management. The field work at Round Mountain included site mapping, surface collection and detailed recording of all 17 rock ring foundations, and many of these were photographed with numerous overlapping, digital

pictures that could be used to create 3D images. In 2015 Mark Willis collected aerial imagery of multiple sites in the Duncan area including Round Mountain and DotMon using kite and drone technology. Excavations focused on the recovery of botanical and radiocarbon samples as well as the morphology and content of the structures. Excavation units targeted deeper deposits in culturally constructed hillside terraces as well as the rock rings. Seven excavation units were excavated in terraces and rock rings and one structure, rock ring Feature E, was completely excavated using quadrants. Table 1 lists the units excavated. Rock rings were labeled Feature A to Q. Generally, excavation units were 1 x 1 m but occasionally larger units (1 x 2 m) or smaller units were used as needed. At DotMon we conducted mapping, surface documentation of the seven rock ring features (Features A to G) and a single unit was excavated in Feature A (Roney et al. 2016). All units were excavated by hand using trowels, with all sediment passed through an 1/8 inch mesh screen and all artifacts were retained. Soil textures and colors were described using the USDA Soils Texture and Color Chart and the Munsell Soil Color Chart. Sediment samples were taken from each level, starting with the second level in each unit for flotation purposes.

[Table 1 about here]

We generally found Round Mountain to be in good condition with some indication of modern impacts. There is evidence of limited bulldozer activity, including creating breaks in the 30 m diameter wall at the summit of the site. This disturbance was visible in the form of several push piles on the edges of the bulldozer pass. This damage appears to be old and presumably was due to mineral exploration. Other evidence of modern activities included a brass cap survey marker along with associated lathe and wire, a few aluminum cans near the summit, and a small area of recent disturbance near our Test Unit 3, which appeared to be a looter's hole.

The DotMon site was also in good condition although both rock ring Features A and B appeared to be refurbished in recent times, meaning some rocks had apparently been returned to walls. The modern radiocarbon date from Feature A implies recent burning and disturbance.

Architecture

At Round Mountain there are 1.9 km of walls and terraces and they form a series of 3 to 4 concentric bands in an organized spatial plan (Figure 2). The walls completely enclose a circular 4.7 ha area that measures 270 m (north-south) by 240 m (east-west). A number of outlying walls on the north and northeast sides expand the total site area to 6.15 ha. Culturally constructed terraces are integrated into the walls and some have notable sediment fill upslope of their walls.

[Figure 2 about here]

The walls and terraces frequently incorporate exposed bedrock scarps, cliffs, and outcrops. We mapped these natural features when they were integral to the spatial organization of the site (Figure 2). Walls and terraces intermingled and we did not distinguish between them. True terraces were present with substantial deposits on their upslope sides. Most constructions were low, simple rubble walls that are one to several courses high that are best described as berm walls. There were no instances of formal, vertical masonry walls. Berm walls run up and down slopes as well as following contours. Often, where contours are followed, there was no deposit of soil and rubble behind them, so it would be inaccurate to refer to them as terraces. All constructions were informal and made by piling cobbles into long windrows. One notable characteristic was the integration of up to one-meter tall, upright rocks into the construction. These were placed along the walls at varying intervals and their purpose is unknown.

Several of the largest of the terraces have a maximum depth of ca. 1.2 meters, and were targets of excavation particularly to recover radiocarbon and botanical samples. At the summit,

the innermost wall and terrace construction integrate with bedrock to form a circle 30 m in diameter. This is the most massive construction on the site with a berm that is perhaps 1.5 meters high and 6 to 8 meters wide. This 30 m diameter enclosed area incorporates the apex of the hill, but it is not level as it has a 12% slope towards the south. A high concentration of metates, which is not well understood, is present along the interior and exterior of the east side of this circular wall.

The DotMon site perimeter is defined by a combination of constructed walls of basalt cobbles and large rocks, and natural bedrock ledges, which enclose an area 125 m by 65 m or about 0.53 ha. (Figure 3). The western side is completely enclosed by a low, constructed berm wall and it articulates with a natural scarp and bedrock to form the eastern perimeter. The constructed walls total about 250 m in length.

[Figure 3 about here]

At Round Mountain, the rock ring structures form a loose cluster in the southeast quadrant of the site and occur on several different natural terraces formed by scarps. At both sites we measured the length and width of both the outer diameter and inner diameter of each feature. The circumference of each is defined by a band of collapsed rubble, forming a doughnut shape. Inner and outer diameters were measured and wall edges were defined by the limits of the wall mass, subjectively ignoring loosely scattered rubble. The interior area is calculated using the formula for the area of an ellipse. Medians and interquartile ranges are used as a few outlier dimensions skew the means. Diameters summarized below are the average of length and width.

At Round Mountain, the median outer diameter is 5.8 m and the median inner diameter is 3.1 m (Table 2). The low, collapsed rubble walls form a doughnut and have a median width of 1.3 m. The area inside the rubble wall that is the interior area has a median size of 7.4 m^2 with an inter-quartile range of 1.9 m^2. A histogram (not shown) reflects a unimodal distribution of the

median interior area of all rock rings plus the large outlier, Feature M. This is an anomalous irregular oval of cobbles, with an interior area of 23.3 m^2 and may not be structure at all. The interior area dimension may be a proxy for floor area but likely underestimates it due to the obscuring effects of surface wall collapse (Wall et al. 2019).

[Table 2 about here]

At Round Mountain, surface artifacts were commonly associated with the rock rings; this includes all artifacts visible within the rock ring or within 2 m outside of the structure walls. Chipped stone was associated in 14 out of 17 structures and ground stone was present in 11 cases, including five structures with both manos and metates, four with manos only, and two with metates only. There were no cases with associated ceramics. The numerous artifacts associated with the structures, particularly the ground stone tools, indicate the features generally had a domestic function.

At Round Mountain, 11 of the rock rings are circular to ovoid in outline and three are semicircular representing 180 to 200 degrees of an arc (Table 3). Three are classified as irregular as the aligned cobbles form no evident shape. The walls of the rock rings typically articulate with bedrock (13 cases out of 17), constructed terraces (2) or walls (1). Ten structures have openings that are inferred to be entryways, this includes the three semicircular rock features plus seven others. Patterning is inconclusive as to the directionality of the entryways; four face east, four are to the west, one is to the northwest and one is to the southeast (Table 3). Most commonly the cobble walls form a complete 360° circle or oval and some of those have small entryways. Three structures have larger openings and the walls represent 270° of an arc.

[Table 3 about here]

At Round Mountain we completely excavated Feature E, with dimensions of 5.5 m by 5.5 m, oval rock ring whose western wall was built into a cleft in the bedrock. The excavation indicated the floor was about 20 to 30 cm below the surface, indicating that these structures can be referred to as shallow pithouses. The excavated, interior is a rough oval with dimensions of 2.16 by 2.43 m and the area is 4.1 m^2. While the floor itself was not preserved it is assumed to have been directly above the angular, deteriorating bedrock. The occupants must have laboriously pried out pieces of the bedrock to create a hearth, a small, informal pit, and a large storage pit. The irregular storage pit was 100 cm in diameter and dug 15 to 30 cm into the bedrock. The pit's volume was estimated to be .14 m^3 and could have held 2000 cobs of husked maize and would have yielded calories sufficient for 79 person days using Huckell's (1995) calculations. Overlying the hearth was an inverted basin metate that yielded maize starch (Devio 2016).

The Round Mountain walls provide insight into behavior. The continuity, layout, and organization of the berm wall construction indicates it is unlikely to have grown by accretion but was a product of one or few construction events that involved planning. It is also built at a scale that that would have required a cooperative effort of multiple households. The steep slopes, isolated, high hilltop setting, rapid construction, and an ArcGIS analysis of wall layout are consistent with a defensive function (Hard and Roney 2020:155-159). The integration of natural topography and wall layout is a common pattern at cerros de trincheras and reinforces the argument that the walls are constructed as barriers. The concentric perimeter walls encircle most of the site while the east and southeast sides are protected with steep scarps providing a layered defense (LeBlanc 1999; Peregrine 2004). Whisenhunt (2020:124-125) conducted an ArcGIS viewshed and least cost path analyses that shows that wall placements impede attackers at the

most vulnerable approaches and attackers climbing the slopes would have had limited visibility of walls, providing defenders with distinct advantages. Round Mountain exhibits cooperation among households to build a defensive site.

The 250 m of wall and seven structures at DotMon make it substantially smaller than Round Mountain and similar to a number of other small, likely Early Agricultural period cerros de trincheras recorded in the Río Casas Grandes region (Hard and Roney 2020:Table 4.1). The perimeter berm wall encircles over half the western side and intersects a natural scarp with outcrops to define the other side of the perimeter (Figure 3).

The seven DotMon rock ring structures are similar to those at Round Mountain although they trend smaller. They are loosely scattered within the perimeter walls. Two, Features A and B, articulate by sharing a wall, a pattern seen at the Sanchez site (Carpenter and Hard 2019). The median outer diameter of all structures is 4.9 m, the median inner diameter is 2.7 m, and the median interior area is 5.5 m^2 (Table 2).

At DotMon, surface chipped stone artifacts are associated with all seven structures but only one structure is associated with ground stone. On the surface, a possible pipe fragment and mano fragment were found associated with Feature B, the largest structure. No features were associated with ceramics consistent with the Early Agricultural period age assignment of the site. At DotMon, five of the rock rings are circular in outline and two are semicircular representing 270 to 360 degrees of an arc (Table 3). Only one articulates with bedrock. Six of seven structures have openings and patterning is discernable in this small sample; three are to the northeast, the others are to the east, north and south (Table 3).

The seven DotMon structures, with a median inner area of 5.5 m^2 trend notably smaller in size than those at Round Mountain which had a median inner area of 7.4 m^2. Similarly, the

DotMon median wall width of 1.0 m is smaller than the 1.3 m width at Round Mountain. The DotMon structures are also more variable in size as there are three structures less than 4.2 m^2 in size plus the single large one has an inner area of 15 m^2. A histogram of 143 rock rings from the Upper Gila River Sanchez site, which dates to both the Early Ceramic and Early Agricultural periods, yielded a multimodal pattern with a break at 4.2 m^2, implying small structures may have a different function (Wall et al. 2019).

These surface data, coupled with excavations, support our inference that the rock rings are small, oval to circular, shallow pithouses which were constructed with low rock walls, 3 to 6 courses high and likely had a brush superstructure. Interior areas average about 4 to 7 m^2. One excavated house had an interior storage pit and a hearth covered by a metate. Most of the pit structures served domestic purposes although some may have had other functions.

Artifacts

While working at Round Mountain and DotMon, we mapped all formal artifacts and pieces of obsidian debitage. Specific artifacts were collected only if they were needed for further typological or compositional analysis. These included sherds and formal lithic artifacts, as well as pieces of obsidian debitage and obsidian cores (Table 4). More detailed discussions of results from 2014 and 2015 can be found in Roney et al. (2015; 2016).

[Table 4 about here]

Pottery

Table 5 tabulates all 38 surface sherds collected in 2014 and 2015. Three Circle Red-on-white is well represented. This, along with three Early Style I sherds and other unspecific Mimbres Black-on-white sherds, could imply that the assemblage dates to the Late Pithouse Period, AD 550 to 1000, although the assemblage is very small. Virtually all of the sherds came

from a small area at the very summit of the mountain. A similar pattern of late sherds found on the summit of earlier hilltop residential sites has been observed at other cerros de trincheras, such as Canador Peak (Roney 1999) and Cerro los Torres (Hard and Roney 2020:63-65). Based on counts and distributions, the sherds at Round Mountain, Canador Peak and Cerro los Torres could represent a specialized, later use of these locations, perhaps as shrines. At the Sanchez site, a specialized, reuse occurred during the Mimbres Classic period represented by sherds and a hearth built on an earlier plaza (Hard et al 2023).

[Table 5 about here]

Chipped Stone

Chipped stone artifacts collected from the surface of Round Mountain are illustrated elsewhere (Roney et al. 2015; Roney et al. 2016). Almost all of the chipped stone artifacts were found inside the walls, within the area where evidence of cultural activity is greatest (Figure 2). Of the 31 collected lithic artifacts, 12 are Tularosa Corner-notched points (Justice 2002:217). Conventionally, this projectile point type typically dates between 100 BC and AD 700 to 900. However, at Cerro Juanaqueña, similar points were relatively common in deposits dating to around 1250 BC (Hard and Roney 2020). Seven other projectile points are too fragmentary to identify. The collection includes eight additional bifaces in various stages of manufacture, a possible drill, and three informal artifacts.

Social Artifacts

At Round Mountain we found three unusual stone artifacts, including two stone pipes and a fragment of a rectangular stone mortar made of vesicular basalt. We have come to think of these artifacts as key indicators of the Early Agricultural period riverine adaptations now coming to light in the Basin and Range province of the NW/SW (Hard and Roney 2023). Similar

artifacts have been reported from Early Agricultural period sites in the Tucson Basin (Ferg 1998), in northwestern Chihuahua (Hard and Roney 2020:84-145) and in the Burro Mountains about 80 km to the southeast of Round Mountain (Turnbow 2000). We believe that they reflect an increasing emphasis on ritual activities during this period. An important function of ritual is to reinforce social integration and group cohesion (Roth et al. 2023). It is not surprising, therefore, that material items related to ritual become more prominent during a time of increasing group size, increasing sedentism, and warfare (Hard and Roney 2020, 2023).

Ground Stone

A substantial ground stone assemblage is clustered within the area of the Round Mountain structures as well as adjacent to the east wall of the 30 m diameter enclosure at the site's apex (Figure 2). This surface assemblage consists of 63 metates and 13 intact one-hand manos plus multiple mano fragments. These were documented with a detailed infield analysis and photography but few collections. The metate raw material is 85.7% (54/63) vesicular and non-vesicular basalt that almost certainly originated from the site area. The remainder are virtually all igneous rock that was dissimilar from the basalt on the hill. The metates are largely unmodified; only 17.5% (11/63) had been shaped or pecked. The metate shapes followed the contours of the stone from which they were made rather than a template. They were classified as slab and basin metates but discrimination between forms had an element of subjectivity; basin metates were blocky and tended to have a distinct concave grinding surface, while slab forms were planar and tended to have a flat grinding surface. There are at least three types of slab forms, including small grinding slabs, large slab metates, and grinding slicks on boulders. The small grinding slabs are similar to those described by other researchers as lapstones, paint grinding slabs, and abrading slabs, etc. Similar small grinding slabs are common at Cerro

Juanaqueña (Hard and Roney 2020:291-294). At both sites, the small grinding slabs are unshaped; they are substantially different from the heavily utilized, bowl-shaped, small mortars also recovered at Cerro Juanaqueña (Hard and Roney 2020:121-127).

The basin metates at Round Mountain were not as massive as those at Cerro Juanaqueña and had far less use wear. Using the maximum depth of grinding basin as a proxy for use-life, the median depth of wear was only 2 cm (1.3 to 8.5 cm, IQR = 5.9 cm, n = 5), far less than the 8 cm wear depth of the Cerro Juanaqueña metates. Metate wear management was occurring in that 41.1% of the 56 metates for which this observation was made were utilized on both sides. In summary this metate assemblage represents several types of tools for processing hard, flinty maize, wild seeds as well as products such as paints or other material that is ground in relatively small quantities. The assemblage is expedient in that the metates are not carefully shaped but make use of the basalt on the site with little effort toward crafting a tool of a predetermined form. They are certainly dissimilar to the formalized trough and slab metates seen at later Ceramic period sites. The accumulated use wear that is present on the metates is far greater than what would accumulate in weeks or months but consistent with the wear produced over multiple years, but probably not decades (Hard and Roney 2020:308). In broad outlines this assemblage shares some similarities with those that at Cerro Juanaqueña but with far less use wear.

We recorded the details of 14 complete manos and a polishing stone on the surface of Round Mountain and they generally occurred in the same areas as the metates. Multiple mano fragments are present but were not recorded. Materials are both local basalt as well as rhyolite and pink granite. Most are not shaped but rather make use of stones with the appropriate natural contours. In size they conform to one-hand manos and are oval to circular in plan view and tend to be plano-convex in cross-section. The mean length is 10.6 cm (7.5 to 13 cm, n = 13, std.dev =

1.7) and width is 8.6 cm (5.5 to 11.5 cm, n = 13, std. dev. = 2.2). The mean grinding surface area is 94.1 cm^2 (41.2 to 143.8 cm^2, n = 13, std. dev. 35.8 cm^2). The Round Mountain manos are somewhat smaller in grinding surface area than the Cerro Juanaqueña manos which are 119.4 cm^2. These small Round Mountain manos might imply a relatively low dependence on maize, following the logic of the size efficiency hypothesis, which argues is there is a rough relationship between mano grinding surface area and the relative importance of maize (Hard and Roney 2020:289). However, the Round Mountain mano sample size is small.

The artifact assemblage from the DotMon site is more limited (Table 4). A single sherd from an unspecific Mimbres Black-on-white bowl was found. Formal lithic artifacts included a Tularosa Corner-notched projectile point, four untyped projectile point fragments, two bifaces, and a biface fragment. About a dozen mano fragments, a slab metate, a pestle and two mortar holes were also present. The single social artifact is a possible ground stone pipe fragment.

Obsidian Source Analysis

Steven Shackley (2016) analyzed 76 pieces of obsidian from Round Mountain and DotMon, and the results of this analysis are presented in Table 6. All four obsidian sources represented at these two sites are local. Antelope Creek, North Sawmill, and Mule Mountains are all varieties of the Mule Creek obsidian with primary source areas about 25 km to the northwest of Round Mountain and DotMon. The primary source of the Cow Canyon obsidian is about 50 km to the north, but this obsidian is found in secondary contexts as near as the confluence of the Gila River and the San Francisco River, about 25 km to the northwest. All four sources were also identified in Gila River terrace gravels below the Sanchez site, located 50 km to the west (McKenzie and Shackley 2019). Significantly, no obsidian was linked to Antelope Wells or other

southerly sources in Sonora and Chihuahua, and none was sourced to the Rio Grande gravels to the east.

[Table 6 about here]

Radiocarbon Dates

We prioritized the AMS radiocarbon dating of annual seeds or other short-lived material, but were limited in our choices of potential radiocarbon samples. We submitted four samples that were large enough to date and these are listed in Table 7. Several additional samples were submitted but returned because they were too small to date. We obtained three dates from Round Mountain on annuals or other short-lived material from terraces or rock rings. The sample of charred oak wood from DotMon turned out to be modern. The Round Mountain probability calibration curves are plotted in Figure 4 (Bronk Ramsey 2021; Reimer et al. 2020). It shows that two of the Round Mountain dates do not overlap. The third date falls between these two, corresponding to a fluctuating segment of calibration curve, and therefore has a large calibrated date range. In summary, three calibrated (95% probability) radiocarbon dates of 2770-2720 BP, 2720-2430 BP, and 2490-2335 BP place the occupation in the Late Cienega phase, between 2750 to 1900 BP. Two of the dates fall on or near wiggly sections of the calibration curve creating large error ranges, nonetheless these results suggest there were at least two discrete occupations.

[Table 7 about here]

[Figure 4 about here]

Ethnobotanical Samples

We emphasized botanical sampling to obtain both radiocarbon samples and plant use data. During excavation, we typically collected at least one or two, measured, one liter sediment samples from each level, other than the first level. More flotation samples were taken from

promising contexts. The field team used a decanting method to float the samples (Bohrer and Adams 1977). We submitted 129 flotation light fraction samples from Round Mountain and DotMon to Karen Adams and she analyzed 110 of these (Table 8). Adams's analyses consisted of passing the light fractions through a series of nested geological screens and scanning a large proportion of the size-sorted material under a binocular microscope with the primary goal of finding reproductive or other short-lived plant material suitable for radiocarbon dating and insights into ancient plant use. Results reported in Tables 9 and 10 list ubiquities, that is the number of samples that contained the identified species. Charred specimens were found in 85 (77.3%) of the light fractions, but most items were charred wood while reproductive plant parts were scarce. Adams recovered 17 pieces of reproductive tissue or other non-woody fragment, including one *Zea mays* fragment along with a Euphorbia seed, a Poaceae caryopsis, and others listed in Table 9. The charred wood specimens are listed in Table 10 and they were dominated by juniper (85.9%, 73/85), mesquite (Prosopis, 30.6%), oak (Quercus, 4.7%). as well as grass stems (Poaceae, 8.2%) and a few others. Today juniper is scarce on and near the site while small mesquite shrubs are common. The high frequency of juniper suggests either a shift in the relative density of the tree taxa or harvesting behavior in which the residents were traveling further to emphasize juniper. Given that mesquite is also a high-quality fuel the hypothesis that juniper was denser on and near the site during the Early Agricultural period should be considered.

[Table 8 about here]

[Table 9 about here]

[Table 10 about here]

The low recovery of reproductive tissue, such as seeds, compared to the generally high recovery rates of small pieces of charred wood suggest preservation conditions in the shallow

units we excavated at Round Mountain are not favorable for more fragile seeds. We found for example, at Cerro Juanaqueña reproductive plant part preservation greatly increased below level seven (Hard and Roney 2020:174-175). At Round Mountain virtually all units were excavated to bedrock but none went lower than level seven and only two units went that deep. Even so, the shallow levels at Round Mountain produced fewer reproductive parts than the shallow levels at Cerro Juanaqueña. The relatively shallow depth of deposits at Round Mountain is one factor among others that may account for the low recovery of reproductive plant parts, even though charred wood recovery was high. Nonetheless, the results show that maize was being consumed on the site and other plants were utilized as well. In addition, polygonal starch grains from a hard kernel maize landrace was recovered from a buried metate excavated from Structure E at Round Mountain (Devio 2016). Clearly maize was an element in the diet at Round Mountain.

Discussion

The observations that we have described here are important because they expand the geographic range of a distinctive Early Agricultural period phenomenon that emerged in riverine settings during a favorable mesic interval (Hard and Roney 2020:353-356; 2023). The agricultural strategy was grounded in especially productive settings where favorable climatic conditions combined with geomorphologic variables to provide highly reliable moisture. The result was increasing reliance on agriculture and growing populations. Social implications included higher degrees of sedentism, settlements of unprecedented size, a new emphasis on cooperation beyond the household level, experimentation with new approaches to community integration, and intercommunity competition that at least occasionally resulted in warfare. The archaeological correlates of these developments are large settlements of contemporaneous pit houses with multiple storage facilities and extensive midden deposits; formal irrigation systems

that required cooperation among multiple households to construct, operate, and maintain; evidence of increased skeletal trauma with characteristics consistent with interpersonal violence; a settlement pattern that included at least occasional occupation of fortified hilltop locations; and the appearance of plaza-like features and novel artifacts that likely functioned in the realms of ritual and social organization. Multiple elements of this pattern have been reported previously in northwestern Chihuahua, at the site of La Playa in Sonora, in the Tucson Basin, and in the Safford Valley (Hard and Roney 2020:353-356; 2023). Evidence from Round Mountain and DotMon extends recognition of this pattern into yet another river valley in the basin and range province of the NW/SW.

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Table 1. Excavation units.

Table 2. Rock ring dimensions.

Table 3. Rock ring details.

Table 4. Surface collections from Round Mountain and DotMon.

Table 5. Ceramics found on Round Mountain.

Table 6. Obsidian source analysis.

Table 7. Radiocarbon dates.

Table 8. Flotation sample results.

Table 9. Reproductive and other short-lived tissue from flotation samples.

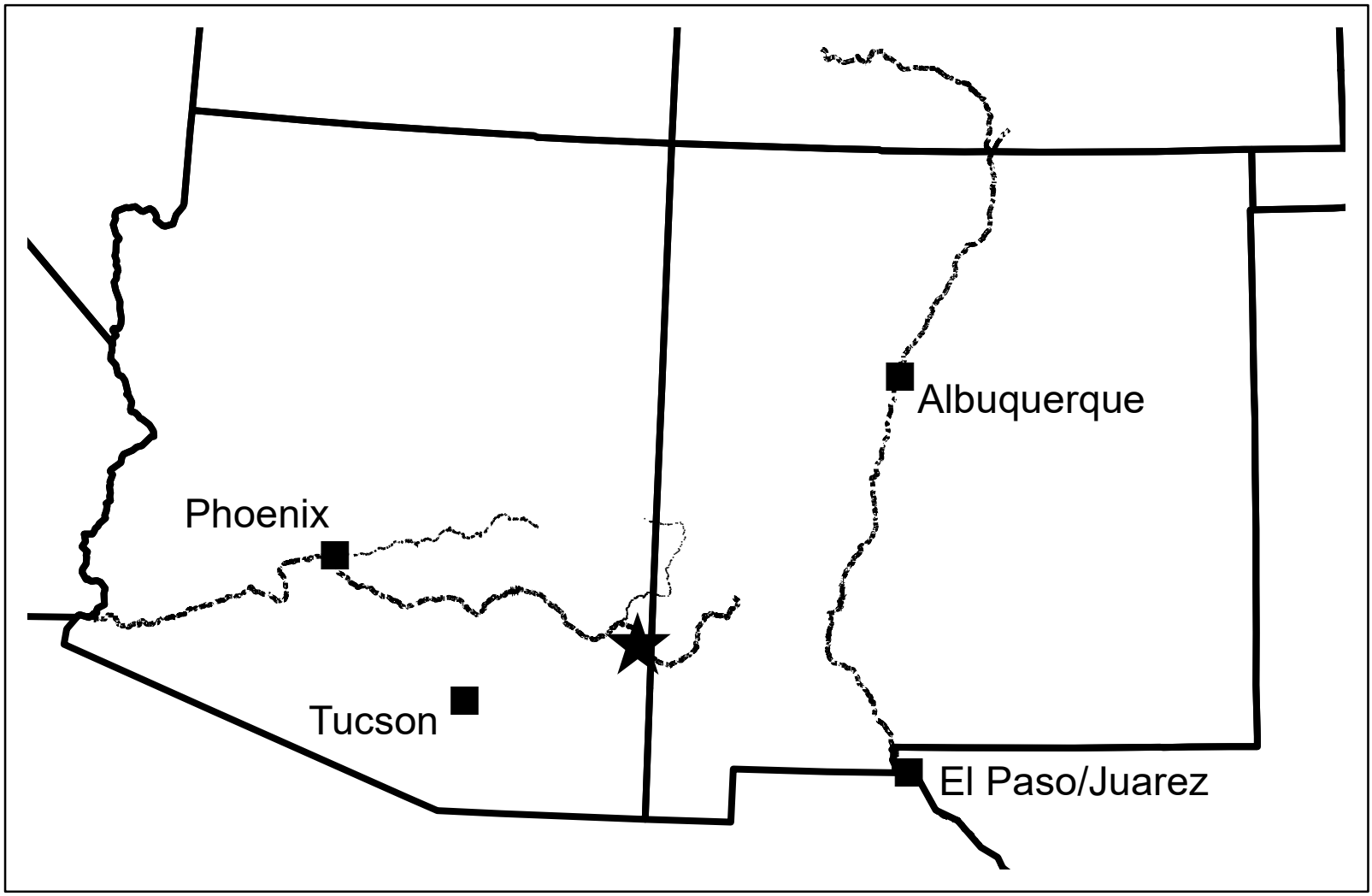
Table 10. Charred wood from flotation samples.

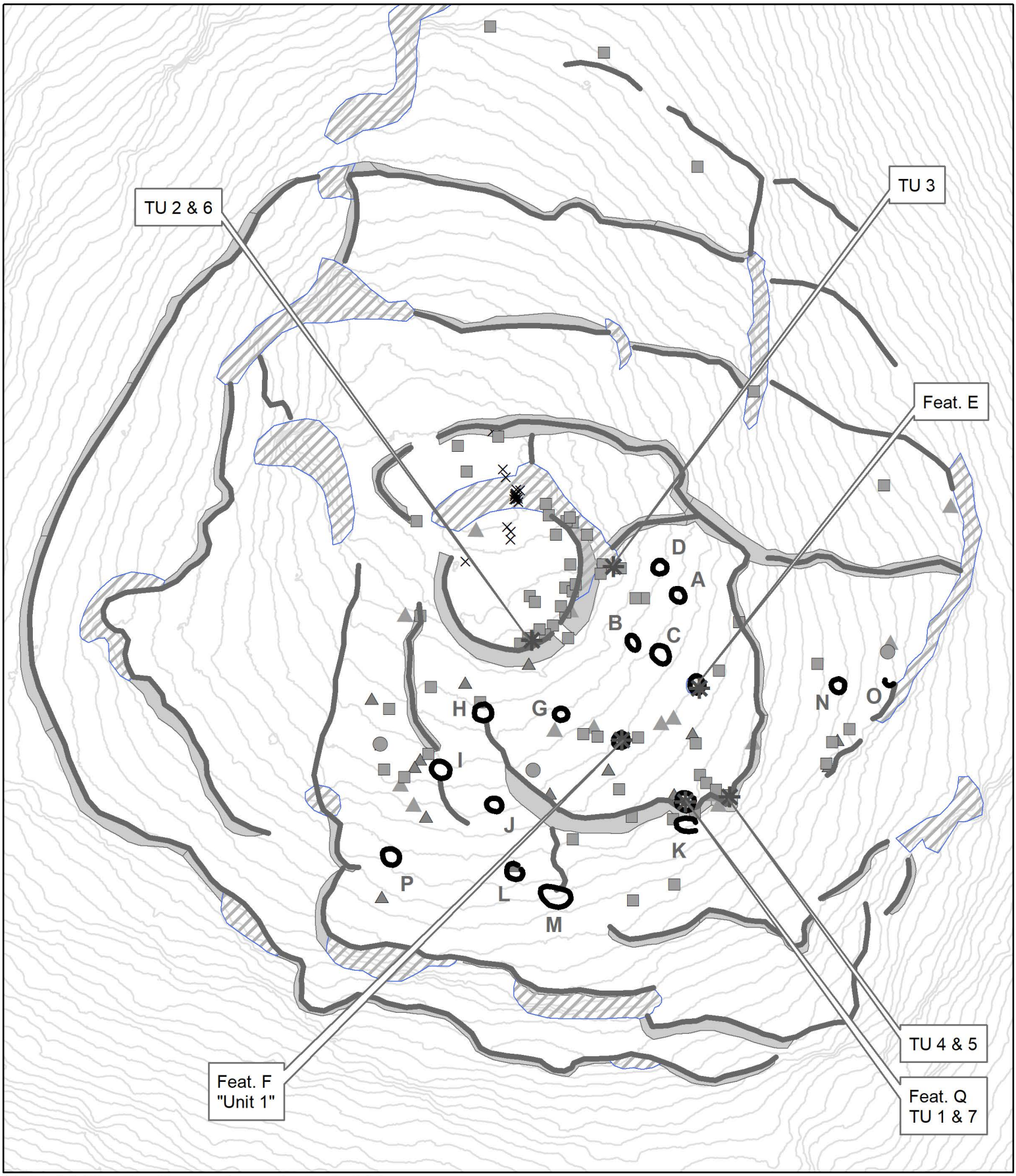
Figure 1. Location map.

Figure 2. Round Mountain.

Figure 3. DotMon.

Figure 4. Calibrated radiocarbon dates.


Albuquerque
Phoenix
Tucson
El Paso/Juarez



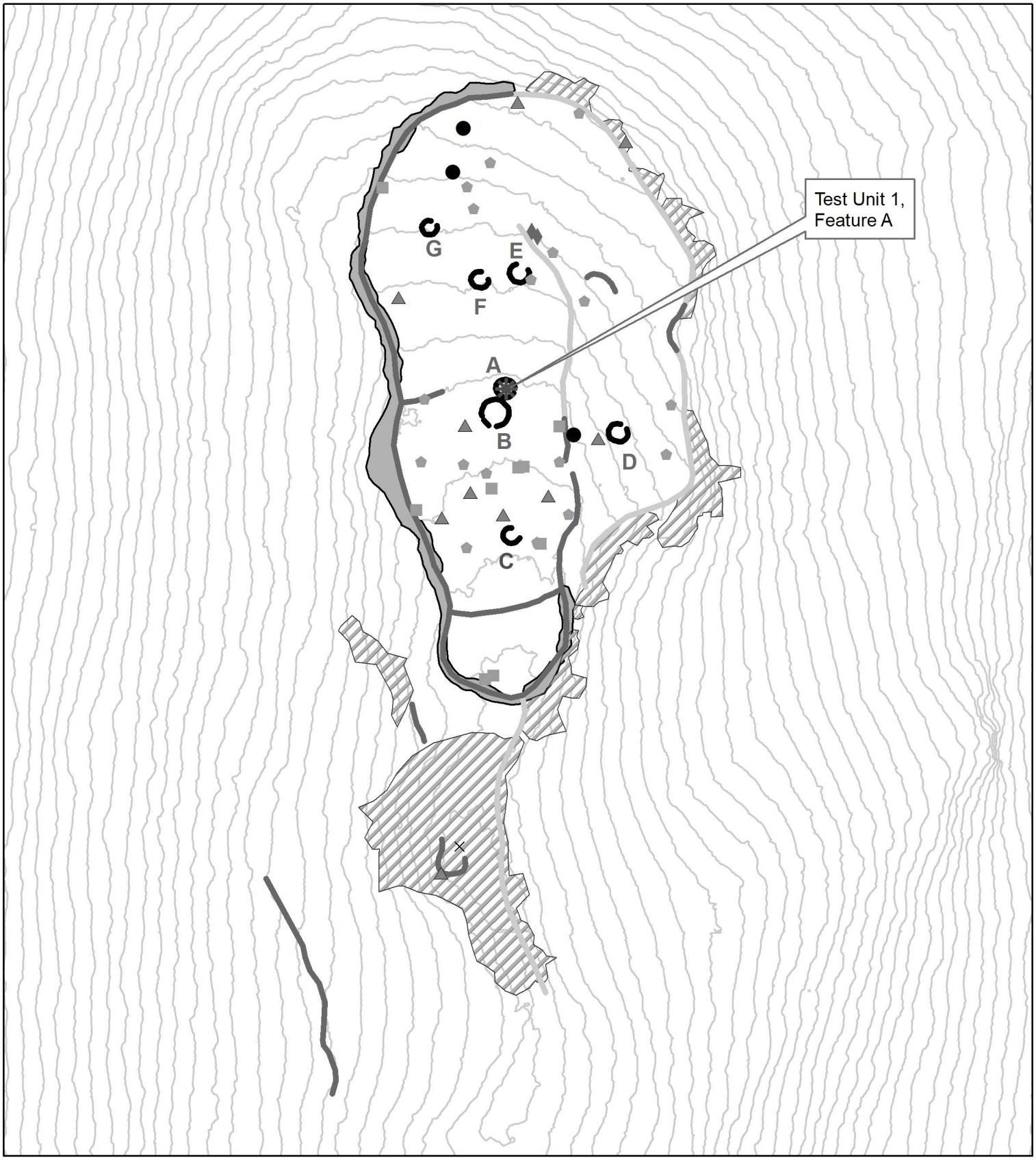
Note: Additional walls occur beyond extent of this map.

Contour Interval: 1.0 m

Test Unit
Wall
Pipe or Mortar
Structure
Metates or Fragment
Pottery Sherd
Formal Chipped Stone Artifact
Mano
Outcrop
Rubble

N

0 25 50 100 Meters


Test Unit 1,
Feature A
A
B
C
D
E
F
G
Contour Interval: 1 meter
Test Unit
Pipe or Mortar Fragment
Mano or Metate
Mortar Hole
Formal Lithic Artifact
Core or Hammerstone
Pottery Sherd
Wall
Natural Scarp
Rubble
Outcrop
Structure
N
Meters
0
20
40
60
80
100

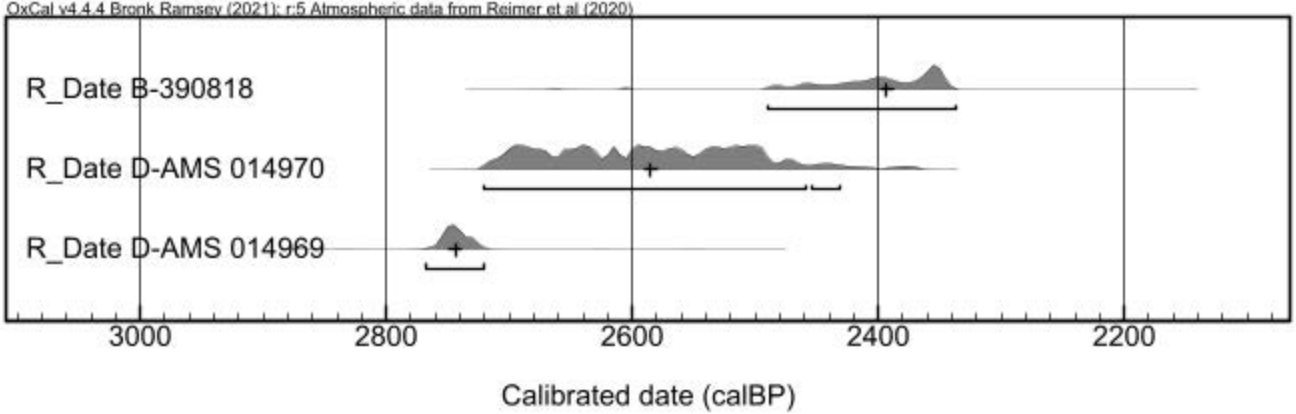

OxCal v4.4.4 Bronk Ramsey (2021); r:5 Atmospheric data from Reimer et al (2020)
R_Date B-390818
R_Date D-AMS 014970
R_Date D-AMS 014969
3000
2800
2600
2400
2200
Calibrated date (calBP)

Table 1. Excavation units.

Year	Site	Excavation Units	Context
2014	Round Mtn	Test Unit 1	Feature Q
2014	Round Mtn	Test Unit 2	Terrace
2014	Round Mtn	Test Unit 3	Terrace
2015	Round Mtn	Test Units 4 & 5	Terrace
2015	Round Mtn	NE & SE quadrants	Feature E
2015	Round Mtn	Unit 1	Feature F
2015	DotMon	Test Unit 1	Feature A
2016	Round Mtn	Test Unit 6	Terrace
2016	Round Mtn	NW & SW quadrants	Feature E
2016	Round Mtn	Test Unit 7	Feature Q

Table 2. Rock ring dimensions.

Site	N	Outer Diameter Min – Max Median (IQR) m	Inner Diameter Min –Max Median (IQR) m	Wall Width Min-Max Median (IQR) m	Interior Area Min-Max Median (IQR) m^2
Round Mtn	17	4.0 - 7.5 5.8 (1.6)	2.5 - 5.5 3.1 (0.4)	0.6 - 2.1 1.3 (0.7)	4.8 - 23.3 7.4 (1.9)
DotMon	7	3.4-6.7 4.9 (2.2)	2.0 - 4.4 2.7 (1.0)	0.7 - 1.9 1.0 (0.3)	3.1 - 15.0 5.5 (3.8)

Table 3. Rock ring details.

Shape	**Round Mtn**	**Dotmon**
Circular	6	5
Ovoid	5	—
Semi-circular	3	2
Irregular	3	—
Total	**17**	**7**

Completeness	**Round Mtn**	**Dotmon**
180°	2	—
200°	1	—
270°	3	1
360°	11	6
Total	**17**	**7**

Opening	**Round Mtn**	**Dotmon**
Present	10	6
Absent	4	—
Indeterminate	3	1
Total	**17**	**7**

Table 4. Surface collections from Round Mountain and DotMon.

Artifact Class	**Year**	**Round Mountain**	**DotMon**
Ceramics	2014	25	—
"	2015	13	1
Formal Lithic Artifacts	2014	19	—
……."	2015	12	8
Obsidian Core/Nucleus	2015	6	—
Obsidian Debitage	2015	45	15
Ground Stone	2015	2	1
Pipe	2014	2	1
Mortar	2014	1	—

Table 5. Ceramics found on Round Mountain.

Type	Bowls	Jars	Indeterminate	Total
Alma Plain	1	7	—	8
Gila Plain (?)	0	1	—	1
Three Circle R/W	2	3	—	5
Mimbres B/W, Style I	3	—	—	3
Mimbres B/W	4	2	—	6
Unidentified Mimbres B/W	4		—	4
White-slipped Brownware	4	5	2	11
TOTAL	18	18	2	38

Table 6. Obsidian source analysis.

Site	Antelope Creek	North Sawmill	Mule Mountains	Cow Canyon	Total
Round Mountain	36 (63%)	12 (21%)	1 (2%)	8 (14%)	57
DotMon	10 (53%)	9 (47%)	0	0	19
Total	46	21	1	8	76

Table 7 Radiocarbon dates

Site	Prov	Level	Depth cm bd	Taxon	Charred plant part	Lab No	^{14}C Age BP ± error	Calibrated 2 sigma BP	Median BP	δ^{13}C ‰
Round Mtn	Fea E, SE Quad	4	60-70	Unk	Fruit frag	D-AMS 014969	2610±29	2770-2720	2745	—
Round Mtn	TU 4	5	70-80	Unk	Plant tissue	D-AMS 014970	2480±26	2720-2430	2585	—
Round Mtn	TU 2	6	60-70	Atriplex	Wood	Beta-390818	2370±30	2490-2335	2395	-11.3
DotMon	Fea A	4	40-46	Quercus	Wood	D-AMS 014971	Modern	—	—	—

Table 8 Flotation sample results

Site	Total float samples	Float samples analyzed	Float samples with charred specimens	Float samples with no charred specimens	Float samples not analyzed
Round Mtn	124	105	85	20	19
DotMon	5	5	4	1	—
Totals	129	110	89	21	19

Table 9 Reproductive and other short-lived tissue from flotation samples

Site	Samples w/ charred specimens	Poaceae caryopsis	Monocot tissue	Monocot twig frag	Unknown tissue/seed	Euphorbia seed	Unknown pith possible Zea mays	Zea mays
Round Mtn	85	1	1	1	13	1		1
DotMon	4	—	—	—	1	—	1	—

Table 10. Charred wood from flotation samples.

Site	Samples w/ charred specimens	Juniperus	Prosopis	Quercus	Rosacea	Populus/Salix	Poaceae stem	Fabaceae	Larrea	Unknown stem	Unknown wood
Round Mtn	85	73	26	4	1	0	7	1	1	3	2
DotMon	4	1	—	2[a]	—	1	—	—	—	—	3

[a]14C AMS date indicates this was of modern origin.