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ARCHAEOLOGY SOUTHWEST

SPRING 2014

magazine

A QUARTERLY PUBLICATION OF ARCHAEOLOGY SOUTHWEST

VOLUME 28 | NUMBER 2

**A Good
Place to
Live**
for more than
**12,000
Years**

Archaeology in Arizona's
Verde Valley

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Todd W. Bostwick

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Cover image: Located northeast of Camp Verde, Arizona, Montezuma Castle is a cliff dwelling comprising twenty rooms built in five distinct levels. Several small Sinagua habitation sites surround nearby Montezuma Well, a limestone sinkhole with subsurface springs that recharge the well at a rate of 1,100 gallons per minute. These locations are protected as Montezuma Castle National Monument. Image: Todd W. Bostwick. Cover design: Kathleen Bader.



Archaeology Southwest

Exploring and protecting the places of our past

Archaeology Southwest Magazine (ISSN 1523-0546)

is a quarterly publication of Archaeology Southwest.

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A Good Place to Live for More Than 12,000 Years: Archaeology in Arizona's Verde Valley

TODD W. BOSTWICK
VERDE VALLEY ARCHAEOLOGY CENTER

Today, people relocate to Sedona and Oak Creek for the breathtaking views and agreeable climate. But archaeology shows us that, because of its reliable water supply and varied ecology, central Arizona's Verde Valley has drawn residents for more than 120 centuries. Researchers Ron Krug and Peter Pilles have found numerous projectile points of Paleoindians and Archaic hunter-gatherers, and the sites of agriculturalists identified as the Southern Sinagua (circa A.D. 600–1425) are scattered throughout the region. Hohokam cultural materials are also present in lowland sites dating between 800 and 1125, indicating that groups from southern Arizona moved into the Verde Valley and coexisted with the Southern Sinagua, or that some of the local Sinagua adopted Hohokam practices. Yavapai and Apache groups have lived in the region for centuries, and the Hopi maintain close ties to this culturally diverse landscape.

The Verde Valley has attracted archaeologists since the 1860s, including renowned figures

such as Jesse Walter Fewkes and Harold S. Colton (see pages 6–7). A founder of the Museum of Northern Arizona, Colton named the *Sinagua* (“without water”) cultural pattern based on his research around Flagstaff, which has no perennial rivers. Due to similar cultural traits between the two areas, Colton later adopted the term *Southern Sinagua* to refer to sites in the Verde region, which has abundant water. (Today, we use *Northern Sinagua* to describe the patterns around Flagstaff.)

There are several types of Southern Sinagua sites in the Verde region. Earlier villages (A.D. 600–900) were clusters of pit structures, now buried beneath the modern ground surface (see page 8). By 900, or perhaps even earlier, people were living in



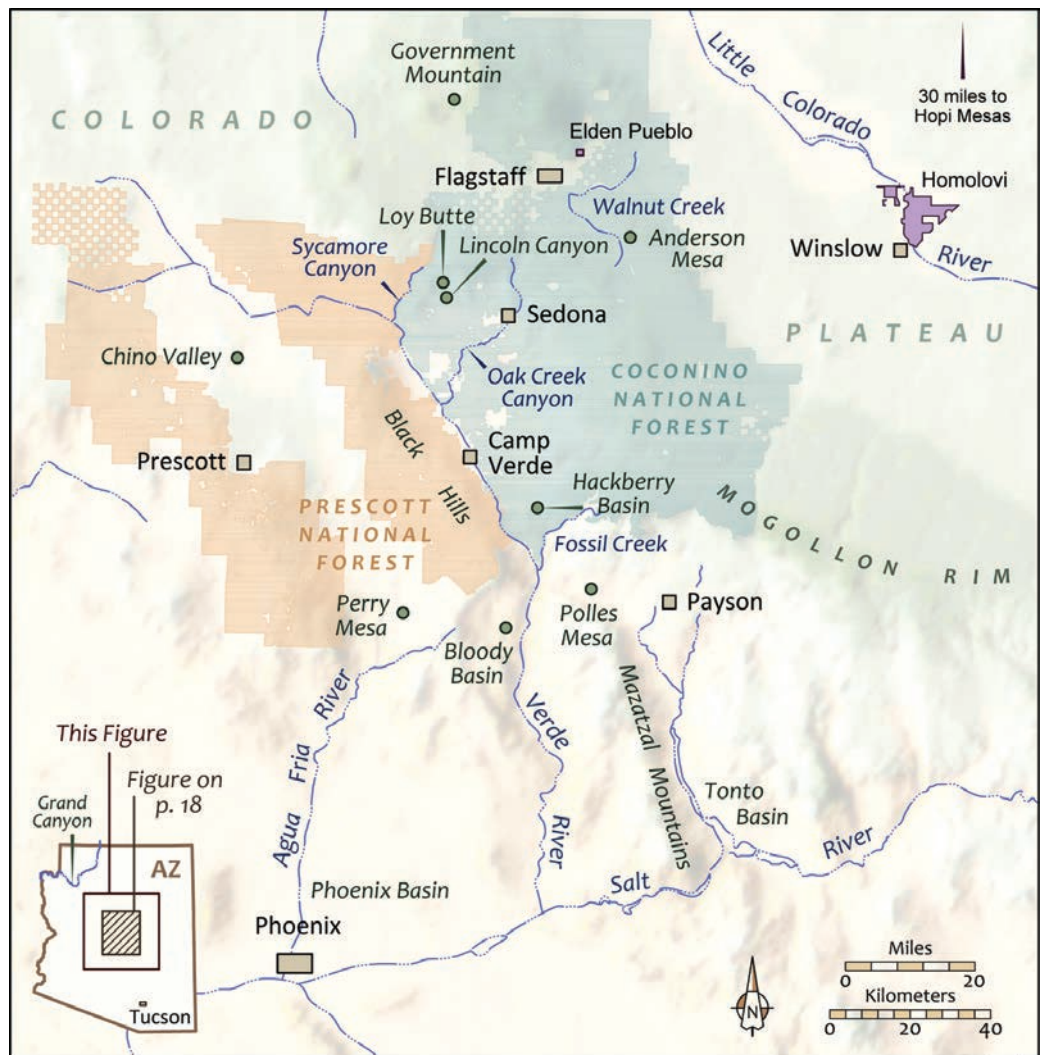
A good number of Southern Sinagua sites are protected. Some are national monuments: Montezuma Castle (cover image), which includes Montezuma Well, and Tuzigoot (pictured on page 7). Three publicly accessible Sinagua sites—the Palatki, Honanki, and V-Bar-V Heritage Sites—are on the Coconino National Forest. Honanki (pictured here) and Palatki are red-rock cliff dwellings in the Sedona area. They contain incredible rock art, including colorful pictographs. The V-Bar-V site consists of hundreds of Sinagua petroglyphs, some of which have calendrical purposes. The Archaeological Conservancy protects several freestanding masonry pueblos, including Ottens Pueblo (Sugarloaf Ruin) and Atkeson Pueblo (Oak Creek Ruin).

PHOTO: TODD W. BOSTWICK

freestanding masonry pueblos, although they continued to build pit structures. After 1125, people also built cliff dwellings as another type of residential architecture. People also lived in *cavates*, groups of interconnecting rooms carved into limestone cliffs. Archaeologist Cosmos Mindeleff recorded many cavates near Camp Verde in the late 1800s (see page 9), and others exist along Oak Creek (see photo on facing page). Numerous resource procurement and processing sites are located throughout the region, including some ingenious agricultural sites identified by Jerome Ehrhardt (see pages 10–11). Southern Sinagua farmers designed these to take advantage of water runoff and occasional rainfall to grow maize, beans, squash, and cotton in a variety of lowland and highland environments.

Agricultural crops and plentiful wild resources enabled an estimated 4,000 to 8,000 people to live in the Verde Valley in the distant past, and we know of more than fifty Southern Sinagua pueblo villages in the region. Lines of sight connecting these settlements formed communication networks. A few villages appear to have been more important, as indicated by their larger sizes, locations along trade routes, higher quantities of trade goods, and inclusion of specialized architecture, such as community rooms and courtyards. David Wilcox has proposed that residents of the larger villages joined communities in adjacent regions to form what he calls the Verde Confederacy (see pages 18–19).

The Southern Sinagua participated in long-distance and local trade networks, adding painted pottery from ancestral Pueblo groups to their own supplies of brown ware pottery. They also traded for marine shells, turquoise, obsidian, argillite, and other items, including macaws and copper bells from



Central Arizona's Verde River is the second largest perennial river in the state, flowing southward for more than 170 miles, from the Chino Valley to the Salt River. The middle portion—the Verde Valley—represents an ancient freshwater lake created when a combination of faulting, basin subsidence, and volcanism blocked the Verde River during the late Miocene and early Pliocene periods. The boundaries of the Verde Valley (also called the Middle Verde) are the Mogollon Rim on the east and northeast, the mouth of Sycamore Canyon to the north, the east-facing slopes of the Black Hills to the west, and the mouth of Fossil Creek to the south. Elevations range from 2,592 feet above sea level at the river to almost 6,000 feet in the Mogollon Highlands. Sedona's striking red rock formations are part of the Verde Valley. MAP: CATHERINE GILMAN

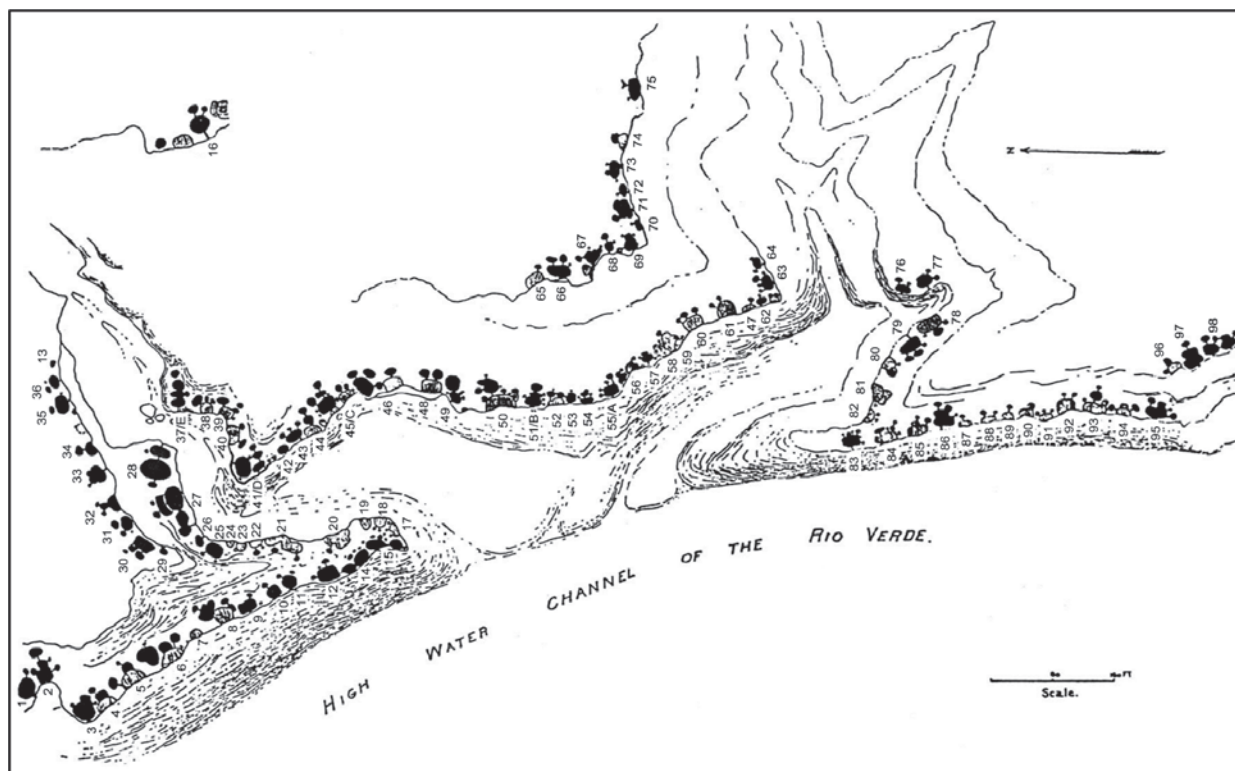
Mexico. Verde Valley inhabitants may have obtained some of those raw materials and craft goods by trading unique species of agave native to the valley (see page 12). Another trade commodity may have been salt, which the Southern Sinagua mined from a deposit in Camp Verde (see pages 13–14).

Researchers are still trying to understand why people left the Verde Valley in the early 1400s. Environmental changes and social factors probably played a role. We also have limited knowledge about how earlier Paleoindians and Archaic hunter-



gatherers used this landscape. We must continue to explore the nature of the connections between the Hohokam and the Sinagua. With the preservation and systematic study of the area's archaeological sites (see pages 22–23), future researchers will be able to continue the quest to better understand ancient life in the Verde Valley. □

Cavate dwellings are clusters of cave-like rooms carved into the faces of soft rock formations. In the American Southwest, the best examples of cavates are in Arizona's Verde Valley and at Bandelier National Monument in New Mexico. This is one of several interconnected cavate dwellings along Oak Creek. The multistory Atkeson Pueblo (Oak Creek Ruin) is located on top of the cliff above the cavates. PHOTO: TODD W. BOSTWICK



The Mindeleff Cavate site (also known as the Mindeleff Cavate Lodge Group), across the Verde River from Beasley Flat, is known for its unusual construction, its large number of relatively intact dwellings, and the complexity of interconnected rooms in those dwellings. Cosmos Mindeleff produced the original version of this fine map in the 1890s. The version you see here includes numbers assigned by researcher Susan Hall almost a century later (see page 9). GRAPHIC: COSMOS MINDELEFF, BUREAU OF AMERICAN ETHNOLOGY, SMITHSONIAN INSTITUTION, ADAPTED BY SUSAN D. HALL

Pioneering Late Nineteenth-Century Archaeologists in the Verde Valley

STEVEN R. JAMES, CALIFORNIA STATE UNIVERSITY AT FULLERTON
PETER J. PILLES JR., COCONINO NATIONAL FOREST

Discovery of gold near Prescott in 1863 stimulated Euro-American settlement of the Verde Valley, but conflicts between settlers and indigenous Apache and Yavapai soon developed. In response, the U.S. Army built a chain of forts across the Arizona Territory. Several military doctors assigned to these posts were

these collections remained at Camp Lincoln. Later, Palmer was able to send only a few specimens to the Smithsonian Institution—a handful of pottery sherds and two corncobs. One of the earliest sketches of ruins at Montezuma Well has been attributed to him. Although Palmer continued to collect

botanical specimens, he also obtained ethnological items and conducted some of the earliest excavations in southwestern and southeastern North America.

Dr. Edgar Alexander Mearns (1856–1916) was another U.S. Army surgeon and naturalist stationed at Fort Verde. While in Arizona (1884–1888), Mearns' interests spanned several fields of scientific inquiry, and his most important archaeological work involved documenting major sites through excavations and photographs, including Oak Creek Ruin, Simmons' White House Ruin, Middle Verde Ruin, Montezuma Well, Montezuma Castle, and the V-Bar-V Ranch



Left: Dr. Edward Palmer in U.S. Army uniform, taken in Kansas City, circa 1864. IMAGE: ©SMITHSONIAN INSTITUTION, DEPARTMENT OF BOTANY Right: Dr. Edgar A. Mearns (left) and Mr. Morse, a practical miner, hired by Mearns at \$4.00 per day, at the Middle Verde Ruin, 1887. IMAGE: COURTESY OF THE LIBRARY OF CONGRESS

naturalists, and their duties extended to the collection of natural history specimens.

Dr. Edward Palmer (1829–1911) was first stationed at Fort Whipple in Prescott, and then at Camp Lincoln (Fort Verde). Although his primary interest was botany, he made the first archaeological collections from Montezuma Well and nearby sites in 1865–1866. Unfortunately, when he was transported to Fort Whipple for emergency medical treatment,

petroglyphs. In 1890, Mearns published an article in *Popular Science Monthly* reporting the first scientific study of Verde Valley archaeology. It was also the earliest account to use “Montezuma’s Castle” as the place name. Mearns located every major fourteenth- and fifteenth-century pueblo in the region, including what later became known as Tuzigoot. In 1888, he transferred to Fort Snelling, Minnesota, and never returned to the Verde Valley. He maintained scientific work as part of his

military career for two more decades.

Although the Bureau of American Ethnology (BAE) at the Smithsonian Institution—newly created in 1879—sent several expeditions to the Southwest in the 1880s, none explored the Verde Valley. That changed in 1891, when Cosmos Mindeleff (1863–1938) conducted a reconnaissance from the confluence of the Salt and Verde Rivers northward to Fort Verde. He described many sites and made detailed plans of six large pueblos—Mercer (Limestone Creek) Ruin, East Verde Ruin, Fossil Creek Ruin, Wingfield Mesa Ruin, and Calloway Ruin—as well as a vast cavate complex now known as Mindeleff’s Cavate Lodge Group (see page 9). The Verde Valley survey report, published by the BAE in 1896, was far superior to contemporaneous examples. This impressive but underused report merits an important place within the foundations of Southwestern research.

Our final pioneering archaeologist is probably the most famous—or infamous, depending on one’s perspective—and he seems to have worked nearly everywhere in the Southwest. Dr. Jesse Walter Fewkes (1850–1930) was educated at Harvard as a marine zoologist. He trained himself in the new fields of ethnology and archaeology when he became director of the Hemenway Southwestern Archaeological Expedition in 1889. When that project closed in 1895, the BAE commissioned him to collect artifacts “illustrating the archaeology of the Southwest.”

During his 1895 expedition, Fewkes examined sites in the Verde Valley and then excavated at Palatki and Honanki, two cliff dwellings near present-day Sedona that had only recently been discovered. Although Fewkes gave the sites Hopi names, the Hopi have no specific traditions about them. In Hopi, *Palatki* means “Red House” and *Honanki* means “Badger House”—though



Dr. Edgar A. Mearns inventorying metates on a porch at Fort Verde, 1887.
PHOTO: COURTESY OF THE LIBRARY OF CONGRESS

Fewkes thought he was naming the latter cliff dwelling after a bear (*Hon*) he had spotted nearby. Fewkes believed the red rock cliffs represented *Palatkwabi*, the place where Hopi oral histories say the *Patki* (Water) Clan originated. He also excavated at Awatovi and Sikyatki on the Hopi Mesas as part of this expedition, bringing 1,000 artifacts to the Smithsonian.

Fewkes returned to the Verde Valley in 1911, for about three weeks, before continuing on

to locate and map hilltop sites along Walnut Creek northwest of Prescott. His focus in the Verde involved investigating Oak Creek Ruin (now known as Atkeson Pueblo) and mapping Honanki, Palatki, and a small cliff dwelling nearby. He subsequently became the fourth chief of the BAE (1918–1928). Near the end of his life, in 1926, Fewkes returned to Flagstaff to excavate Elden Pueblo, an important Northern Sinagua site. 



One of the pueblos Mearns explored is now known as Tuzigoot. This 110-room pueblo overlooking the Verde River is adjacent to Tavaschi Marsh, a rich riparian habitat. It is protected as a national monument. PHOTO: TODD W. BOSTWICK

Verde Valley Pit Structures: Variations through Time

STEWART DEATS
ENVIROSYSTEMS MANAGEMENT

Archaeologists have long recognized and studied differences in the size and architectural characteristics of pit structures in the American Southwest. In the Middle Verde Valley, researchers have excavated at least thirty sites with pit structures, and they have investigated 113 structures to some degree. I recently reviewed twenty reports and compiled data on 100 pit structures

(pueblos). Similarly, I noted a sizable reduction in floor area for Middle Verde Valley pit structures dating after 1300, when people built far fewer pit structures, and large surface pueblos became the primary architectural form.

Another interesting finding was the presence of five structures, dating to three different periods, that were outliers

based on their large sizes. Other than size, however, I found no characteristics in common that definitively set these large examples apart from other pit structures. Nevertheless, there were some interesting differences. Two larger structures had interior subfeatures that might have anchored walls functioning as privacy screens or wind deflectors. The larger structures also had much higher rates of wall-post footing grooves around the floor perimeter, as well as evidence of raised floors, platforms, or benches. Based on the variety of artifacts recovered, people clearly undertook a range of activities in the larger structures. Yet these activities do not appear to have been restricted to the larger structures, arguing against them being restricted spaces used solely for special occasions.

Additional analyses showed no correlation between site elevation and structure size, depth, or shape. Nonetheless, people dug most pit structures to a consistent depth until around 1150, when pit structures were deeper and their interiors were

usually lined with masonry. In contrast, there was a highly significant difference in the proportions of various structure shapes based on whether they were in a riverine or highland environment. These differences could be a function of varying thermal efficiency needs dictated by a disparity in climate and location factors between the two zones. Such environmental influence would be an important factor if residents inhabited the riverine and highland pit structures at different seasons, rather than year-round. If so, then differing subsistence activities associated with each environmental zone—agriculture or foraging, for example—also might have influenced architectural needs. Alternatively, the significant differences in the proportions of riverine and highland pit shapes might indicate the presence of different ethnic groups in the two zones. Further investigation should help us determine what these differences mean. ■



Overlapping Southern Sinagua pit structures in the Middle Verde Valley. PHOTO: STEWART DEATS

at twenty-six Middle Verde Valley sites. I recorded twenty-three variables, half of which were architectural attributes, for each pit structure.

My study showed that pit structure size changed significantly over time. For example, structures dating after A.D. 800 were substantially larger than earlier ones. Similar size increases occurred in other regions of the Southwest, but generally a few centuries earlier. Elsewhere, researchers have associated this change with the adoption of pottery technology. In the Verde Valley, however, the timing coincides with the well-documented rise of Hohokam influence in the area. Another widespread change in structure size noted in other parts of the Southwest is a subsequent decrease in floor area wherever early ceramic period pithouses had been quite large. In most areas, this move to smaller domestic pit structures occurred as people began building and using surface architecture

The Mindeleff Cavate Site

SUSAN D. HALL
DESERT ARCHAEOLOGY, INC.

“Cavate lodges comprise a type of structures closely related to cliff houses and cave dwellings...They differ from the cliff houses and cave dwellings principally in the fact that the rooms are hollowed out of cliffs and hills by human agency, being cut out of soft rock...”

—Cosmos Mindeleff
“Aboriginal Remains in Verde Valley, Arizona,”
Thirteenth Annual Report of the Bureau of Ethnology, 1896, page 209

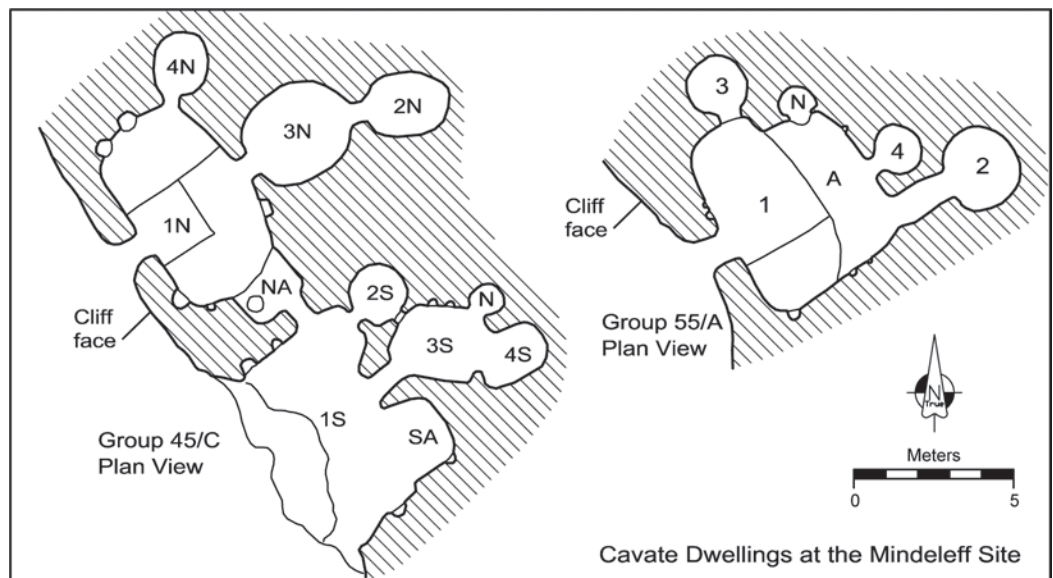
Along with Mindeleff's comprehensive description of the place now known as “Mindeleff's Cavate Lodge Group” or the Mindeleff Cavate site, he produced a plan illustrating this remarkable concentration of dwellings carved into soft sandstone. For my 1992 master's thesis at Northern Arizona University, I collected data for 343 rooms in eighty-nine cavate dwellings at the site, an endeavor made easier by Mindeleff's excellent overall plan (see page 5).

The best-preserved dwellings have well-made doorways, and a few even have small, round vestibules. Upon entering, one is inside a large rectangular or oval-shaped room with smoke-blackened walls and ceiling. This main living room generally has a hearth, raised benches, wall niches, and occasionally a floor pit, all sculpted into the soft rock. Most secondary rooms are directly connected to a main room, but some serve as passages to rooms farther back. Many dwellings have a special room that I called a raised alcove. Each alcove opens on a main room, providing a convenient and comfortable place to sit, work, or sleep. I also identified many small, round storage rooms that were accessible from the main room through a doorway or low tunnel.

Overall, I found that five typical room arrangements occur repeatedly, and I noted a few other patterns: there are more alcoves and storage rooms in dwellings overlooking the Verde

River; more alcoves at the southern arm and fewer at the northern arm; and the largest dwellings occur in the lower central section. The latter devote more space to storage rooms.

The relatively intact condition of the cavate dwellings made it easy to imagine how people had lived in them. One of my



Left: Group 45/C, an example of an extensive group of rooms. Right: Group 55/A, Hall's favorite dwelling.
GRAPHIC: SUSAN D. HALL

favorites is my number 55/Mindeleff Group G, which had not deteriorated much since Mindeleff's time. The floor plan and the arrangement of wall niches suggest three distinct activity areas, and the alcove is better integrated with the main room than is typical. This group of rooms was so inviting, I could have swept the debris out the door and moved right in—alas, I could not find the rental agent!

For references to Hall's 1992 thesis and Mindeleff's 1896 report, visit archaeologysouthwest.org/asw28-2. ■

Southern Sinagua Farming Methods Revealed

JEROME P. EHRHARDT
ARIZONA ARCHAEOLOGICAL SOCIETY

For the past thirteen years, members of the Verde Valley Chapter of the Arizona Archaeological Society have been conducting full-coverage archaeological surveys on the western-facing slopes and foothills of the Mogollon Rim in the Middle Verde Valley. Crews have recorded more than 400 previously unknown

moisture, and use of retaining walls on slopes to increase water infiltration, especially in clay soils. Importantly, people added midden waste—compost from trash mounds at their villages and elsewhere—to soil to increase crop productivity.

The two study areas we recorded were different in soil composition and terrain. The first surveys took place in Lincoln Canyon in the valley's northeastern corner, at the foot of sandstone buttes. Here, the soil is mostly a sandy loam, and the majority of garden features are large sloping fields with low rock terraces. There is also an agricultural feature near the base of Loy Butte that is similar to Hopi use of sand dunes. Southern Sinagua farmers built a 165-foot-long, three-foot-high retaining wall across the slope and then filled the area between the wall and the side of the butte with sandy soil to create a large, deep garden. Water draining from the butte's top irrigated the plot.

The second survey area was in volcanic terrain around Sycamore Canyon and Hackberry Basin,



Jim Graceffa (see page 21) examines a trinchera site in Sycamore Canyon Wash, 2005. PHOTO: JEROME P. EHRHARDT

sites dating between A.D. 750 and 1350. These include masonry structures (small pueblos and fieldhouses), cave dwellings, roasting pits, water catchments, and agricultural gardens and fields.

Perhaps the most important discovery was evidence that people had modified the land for agricultural purposes. Ancient modifications include increased soil depth through *trincheras* (terraces) and raised garden plots, use of hill and mesa slopes for sheet irrigation, mulching with small stones to retain soil

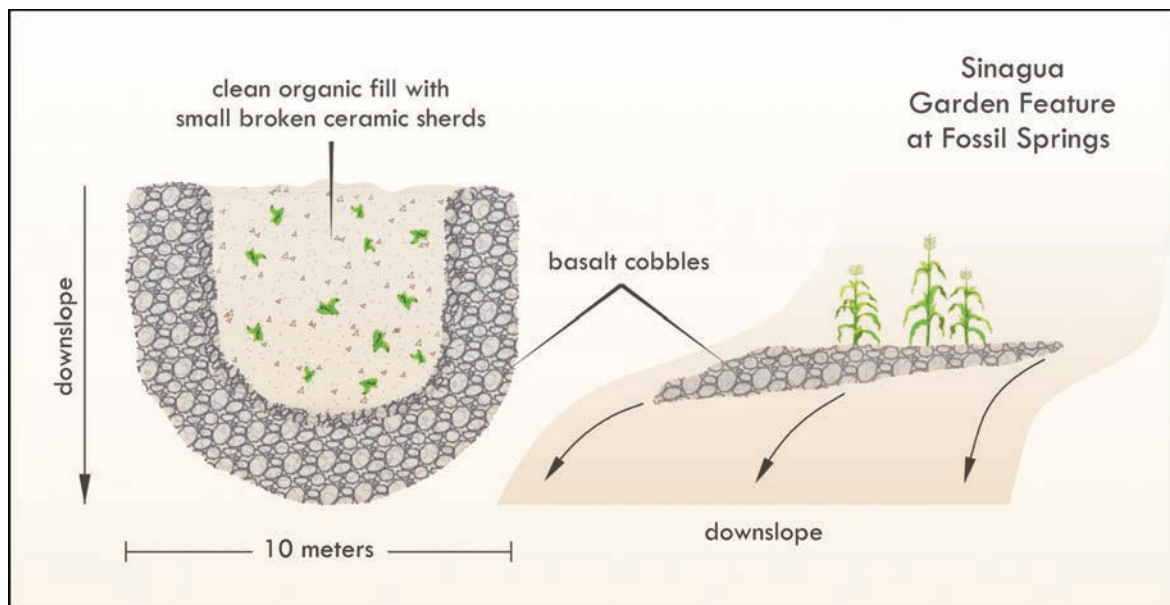
south of Camp Verde. The soil in this area mostly comprises clay loam. It has varying amounts and sizes of gravel that may have required more labor to cultivate. On the mesa tops and upper slopes, at about one mile above sea level, we found fields and raised gardens. On the downhill slopes, we recorded linear rock alignments, and on the steeper slopes, we documented random, flat terraces that would have been irrigated by sheet wash. At the lowest elevations, we encountered rock-bordered gardens, water catchments, and fields irrigated by ephemeral



wash flows.

As we recorded these agricultural sites, we often noticed a high concentration of ceramic sherd scatters within the features' boundaries. Because we have not found trash middens in either survey area, we surmise that people used trash—including broken pottery and tools, ash, organic waste, and possibly night soil (human waste)—for mulch and fertilizer. In fact, before we identified this phenomenon, archaeologists may have recorded raised gardens as field houses.

Ancient agave-roasting pits may also be related to agricultural practices. Agave was a cultivar in the distant past (see page 12), and we have found many roasting pits in both of our survey locations. At one agricultural site, we noted that the



Southern Sinagua garden feature at Fossil Springs. GRAPHIC: CATHERINE GILMAN AND JEROME P. EHRHARDT

garden soil included ash and molten rock debris from a roasting pit. People could have used ash from roasting pits in any nearby garden. The large terrace garden in Lincoln Canyon also had a large roasting pit in the center of the embankment. To test our hypothesis about ash use, archaeologists will have to report the presence of fire-cracked rock in garden features. ■

The Camp Verde Meteorite

A “collector” of Indian artifacts discovered this meteorite in 1915, at a Southern Sinagua site southeast of Camp Verde. Dr. H. H. Nininger acquired the meteorite in 1939 after visiting the site with the collector and John Cotter, an archaeologist at Tuzigoot National Monument. The collector described finding the meteorite in a stone-lined box within the eastern wall of the pueblo, which faces the sunrise. Further, people had wrapped the meteorite in a feather blanket.

Placement of meteorites within stone features or stone-lined boxes may have been a standard practice, reflecting a pattern of ancient meteorite reverence throughout the Greater Southwest. We know of ancient examples of similar treatment from Winona Ruins, east of Flagstaff, and from Casas Grandes, in Chihuahua, Mexico.

—Kenneth J. Zoll, Verde Valley Archaeology Center

The Camp Verde meteorite. PHOTO: TODD W. BOSTWICK



Living Artifacts in the Verde Valley

Agaves (“century plants”) have played an important role in peoples’ lives for thousands of years, providing food, beverage, fiber, and many other uses. We are still trying to understand their importance to peoples of the Southwest in the centuries before contact with Europeans, however. In 1985, archaeologists published evidence that people living north of Tucson in approximately A.D. 700 had extensively cultivated agaves. Questions remain as to which kinds of agave they were cultivating and how extensively they were farming these desert plants.

Scientists from the Desert Botanical Garden recently found and described four species new to science that we believe to be precontact domesticates: Tonto Basin agave (*Agave delamateri*), Phillips’ agave (*Agave phillipsiana*), Sacred Mountain agave (*Agave verdensis*), and Page Springs agave (*Agave yavapaiensis*). All occur only in Arizona, including the Verde Valley, and the Sacred Mountain and Page Springs agaves are restricted to the Verde Valley—they do not grow anywhere else in the world!

Agave plants seen today are remnants of populations once farmed several centuries ago. They have persisted via reproduction by offsets from underground stems, a characteristic ancient farmers may have selected for (other likely characteristics selected may be easily cut leaves, sweet taste, and time of flowering). Because agaves reproduce mainly by vegetative means and not seed, researchers have a rare window of opportunity to observe and study plants that are genetically identical to plants farmed perhaps as far back as 1,000 years ago, in their archaeological context! We have evidence that Verde Valley inhabitants traded *Agave delamateri* and *Agave phillipsiana* to residents of the Tonto Basin, and they traded *A. phillipsiana* with cultures south of Prescott and as far north as the Grand Canyon.

The origins of these agaves are unknown at present, but may be the hills of northern Sonora or Chihuahua, Mexico, where they have not yet been found. What other agaves may be cultivars or domesticates? Garden researchers working in collaboration with archaeologists hope to answer such questions.

—Wendy C. Hodgson and Andrew M. Salywon, Desert Botanical Garden



A Page Springs agave plant growing in the Verde Valley. PHOTO: WENDY C. HODGSON

Food for Thought...

Formally designated in an earlier era, the official names of several sites in the Verde Valley include the word “ruins.” Descendant communities do not view these places as ruins, however; rather, they see the remains of settlements as footprints or markers of the lives and journeys of their ancestors, some of whom remain there. Such places are replete with stories, messages, and lessons—they are not used up or abandoned. This view resonates with today’s archaeologists, who see sites not as “ruins” but as places rich with information about life in the past.



The Verde Salt Mine

TODD W. BOSTWICK, VERDE VALLEY ARCHAEOLOGY CENTER
NANCY JO CHABOT, MT. KEARSARGE INDIAN MUSEUM

Hopi and Zuni oral traditions about a deity known as Salt Woman attest salt's status as a sacred commodity in the past. A thick salt deposit with beautiful blue halite crystals lies in Camp Verde, the remains of an ancient freshwater lake that created the Verde Valley. We have evidence that Southern Sinagua people mined this salt.

Commercial mining of the salt deposits in the 1920s employed a large mechanical shovel. Firms as far away as Norway and Sweden bought salt for use in glass and paper manufacturing. In the 1930s, less-expensive foreign salt put the mine out of business.

In 1926, the mine superintendent informed the American Museum of Natural History (AMNH) that mining had revealed human mummies in the deposits. Earl Morris (see *Archaeology Southwest Magazine* 28:1) visited the salt mine that year and returned to AMNH with a number of artifacts uncovered by the shovel operations. Byron Cummings, then director of the Arizona State Museum (ASM), visited the mine in 1926 and 1927, obtaining artifacts and human mummies. In 1928, Morris published a report of his visit that described four ancient tunnels in the 85-foot-tall cliff exposure. One of the tunnels was at least 200 feet long, with no timber shoring. Morris and Cummings believed the people buried in the mine had perished during cave-ins.

Further study of the mine's contents did not occur until 1992, when Chabot reanalyzed more than 125 artifacts at AMNH and ASM. She obtained radiocarbon dates on five wooden pick handles and a bark torch, dating the artifacts (A.D. 1336–1413) to the final century of the Southern Sinagua. More recently, Bostwick reanalyzed the ASM artifacts and examined previously unreported artifacts donated to the Museum of Northern Arizona in the 1930s.

The salt mine revealed a variety of well-preserved Sinagua artifacts, many of them tools used in mining operations. These include thirty-three $\frac{3}{4}$ -groove stone picks and broken fragments, and more than a dozen hand-held picks. The assemblage also includes forty-nine J-shaped wooden hafts, shaped into handles for the $\frac{3}{4}$ -groove picks. To light the tunnels, people used bark torches (14), a wooden fire drill (1), and fire-drill hearths (3). Several carefully wrapped and bent twig bundles may be ancient backpacks, and fourteen woven agave-fiber sandals—all heavily salt-encrusted—protected miners' feet. Woven mats may have provided seating.

Some artifacts appear to be offerings, possibly associated with the individuals buried in the tunnels, but the absence of field notes hinders conclusive interpretations. Several carved sticks originally interpreted as digging sticks may actually be prayer sticks, which are commonly associated with salt deposits in the Southwest. Other



Ancient objects recovered from the Verde salt mine, counterclockwise from top: blue halite crystal, about two inches long (Arizona State Museum [ASM] No. 23561); juniper bark torch (ASM No. 16241); salt-encrusted sandal (ASM No. 16204); $\frac{3}{4}$ -groove axe head (Museum of Northern Arizona [MNA]); J-shaped wooden haft (MNA). Photo scales are 10 cm (about 4 inches). PHOTOS: TODD W. BOSTWICK



possible offerings include coiled basketry plaques, two wooden weaving tools, a cane cigarette, marine shell bracelets, and pieces of maize and charcoal. People from distant pueblos may have left offerings for Salt Woman when they came to the Verde mine to obtain salt.

Catalog cards at ASM suggest that the mummies wore cotton-cloth headdresses and breechcloths. Some of the recovered cloth fragments are fine, loom-woven textiles that probably reflect intentional burials, rather than workers who died in an accident. ■

Southern Sinagua Sunwatching Methods in the Verde Valley

KENNETH J. ZOLL
VERDE VALLEY ARCHAEOLOGY CENTER

Surrounded by clocks, smartphones, and calendars, we take for granted the development of a concept of time. The daily newspaper, or more likely an “app,” tells us when the sun will rise and set so we can plan our day. Centuries ago, Verde Valley Sinaguans employed a range of solar observation methods.

Puebloan sunwatchers, or Sun Priests, made their observations at sunrise or sunset from a special position within or close to the pueblo. To ensure repeatable and useful observations, they had to stand at the same spot each time. They had to be aware of the movement of the sun along natural features on the horizon, and they had to use these features as markers for recording certain time points during the year. Sometimes, we can identify such sunwatcher stations.

The Honanki Heritage Site (A.D. 1100–1300) is a Southern Sinagua dwelling with more than seventy rooms at the base of a large butte (see map on page 18). Because the dwellings face southwest, one cannot observe the sunrise there. Around the base of the butte to the east, however, is an outcropped ridge of sandstone under a natural overhang. Near the center of the outcrop is a rounded section that protrudes from the ridge. Atop this protrusion is an area that someone has smoothed to produce an elliptical bowl in a southeastern direction. At the

top of the bowl is a half-sun petroglyph.

This sunwatcher station, one of three known from the Verde Valley, offers the first eastern horizon view from the Honanki dwelling area. In his book *Big Falling Snow*, Albert Yava describes how his father, a Sun Priest, would observe the horizon from “a natural bowl in the rock, a kind of smoothed-out pothole, and he would record his readings inside that bowl.”



Palatki shield at equinox. PHOTO: KENNETH J. ZOLL

Another sunwatching technique the Southern Sinagua utilized was light and shadow effects on rock art images. In the Verde Valley, we know of eight such calendar sites using light or shadow across rock art. One of these is located at the Palatki Heritage Site (1150–1300; see map on page 18). Palatki is a complex of cliff dwellings and several rock art areas. In a portion of the site designated the “roasting pit area,” there is a large circular pictograph with four sets of three lines converging to a second smaller circle. Three of the four quadrants of the

larger circle contain small lines from the inner circle. These register marks guide the observer to accurately record dates. At sunrise on the equinox, a diagonal shadow line bisects the circle in line with two register marks. Thirty days before the vernal equinox, at sunset, a sun wedge using two register marks appears. ■

Ancient Rock Art of the Verde Valley

PETER J. PILLES JR.
COCONINO NATIONAL FOREST

Thousands of petroglyphs and pictographs create an amazing open-air museum in the Verde Valley. Whether pecked, scratched or abraded (petroglyphs), or painted (pictographs), these markings represent human connections with the Verde's scenic landscape over the millennia, documenting the presence of people for as long as humans have populated North America. But these images go beyond decorative art, presenting a layered depth of meaning and symbolism to the people who created them.

Earliest Rock Art, 9,500–7,000 B.C.

The earliest rock art style in the Verde Valley consistently lies beneath the pecked or painted designs of later groups. It consists of simple geometric designs scratched into the rock. Common elements include grids, asterisks, rows of vertical or diagonal lines, and multiple crisscrossed lines. Clovis-style projectile points from the Sedona area attest to the presence of Paleoindian groups, and researchers have documented similar scratched designs at Clovis sites, suggesting these Verde images could date to the Paleoindian period. Identical designs are also present in Yavapai and Apache rock art, but those are not as weathered.

The Archaic Period, 7,000 B.C.–A.D. 600

Archaic rock art in the Verde Valley looks like contemporaneous rock art elsewhere in the western United States and northern

Mexico. It consists of a wide variety of geometric shapes, such as spirals, ladders, dots, rakes (horizontal lines with straight lines hanging from them), squiggle-line rakes, and fringed lines. Naturalistic forms, such as broad-shouldered, triangular human-like figures and faces or masks, are also present, although not in the quantity, size, and diversity found in the Late Archaic and early Basketmaker rock art in the northern Southwest. Another intriguing similarity with other areas are rare examples of large

spirit-like images, reminiscent of Barrier Canyon style figures in Utah, the giant *monos* of Baja California, and the large “shaman” figures of the Pecos River Style in Texas. Such similarities over a vast region may reflect similar lifeways and beliefs among hunting and gathering peoples at the time.

The Southern Sinagua, A.D. 600–1400

With the adoption of agriculture and a more settled lifestyle, people in the Southwest began creating more regionally diverse rock art. Southern Sinagua petroglyphs and pictographs continue to have a variety of rectilinear and curvilinear geometric forms, but figures resembling humans, dogs or coyotes, raptors, water birds, snakes, horned toads, “hunting scenes,” paired humans, flute players, handprints, footprints, and more were also made. Handprint pictographs include hand stencils, for which people blew pigments around a hand held against



Top: Geometric Archaic period pictographs near Palatki. Bottom: This pictograph panel near Palatki was the first rock art site in the Verde Valley dated by AMS radiocarbon dating. The black shield dates to A.D. 700–1210. The white dots on it date to A.D. 1280–1620. Researchers attribute the latter to the Yavapai. PHOTOS: PETER J. PILLES JR.



Top left: Two episodes of Southern Sinagua petroglyph production. The two large, somewhat faded figures in the center are earlier than the deer- and dog-like lighter figures superimposed on them. The even lighter-colored lines and grid patterns were scratched over those at a later date, probably by Yavapai or Apache. Top middle: At Honanki, Yavapai drew a shield-like design over the white Sinagua deer-like form and inverted U-shaped representations of hoofprints. Top right: Yavapai drew several horsemen, grids, and zigzag lines with charcoal in a canyon near Honanki. Bottom right: Skatakaamcha is the major supernatural being in Yavapai creation stories. Depicted here in the Red Rock country outside of Sedona, he is usually drawn larger than other figures in a rock art panel. Here, he is just over two feet tall. The triangles outlining his body probably indicate his association and importance as the first rattlesnake shaman. He appears in dreams to provide knowledge and instructions to those chosen to be rattlesnake shamans. PHOTOS: PETER J. PILLES JR.

a surface, and patterned handprints, where people painted nested U-shapes on their hands before pressing them against the wall. Several recent studies used hand length-to-width ratios and finger lengths to identify individual makers' ages and genders.

The Yavapai, Post-1300

Yavapai rock art employed virtually every technique imaginable. Pictographs show use of charcoal, red hematite or possibly crayons, red clay, and thick, cream-colored pigment. Petroglyphs show pecking, scratching, incising, and abrasion. Charcoal is the most frequent medium, and the elements depicted are simple enough that they might be mistaken for later vandalism. Repeated occurrences of diagnostic Yavapai elements indicate this is not the case, however. Yavapai subject matter differs from Southern Sinagua in that figures resembling big game animals, such as deer, elk, mountain goat, and bears, predominate. Other Yavapai elements include multiple zigzag lines, pine trees, horses, riders, human figures with hair feathers, caps with antelope horns, horsemen with spears and shields, archers, and group-dancing scenes.

Most fascinating, however, are figures the Yavapai identify as depictions of supernatural beings. These include *Akaka*, small beings with rayed headdresses and unnaturally long fingers, who live in rocky places and caves. Illustrations of supernatural beings also show rays emanating from their bodies—an indication of supernatural power.



The most important supernatural depicted in Yavapai rock art is *Skatakaamcha*, the Yavapai culture hero who created humans and taught them curing ceremonies and survival skills. His rayed headdress and the diamond pattern on his chest probably symbolize his rattlesnake shaman association. When present, he is often larger than other images, and other figures, identified as shamans, sometimes appear with him.

The beginning date for Yavapai rock art in the Verde Valley is indeterminate. The prevalence of horses and riders indicates that much of it postdates 1583, when Europeans first entered the Verde Valley. Yavapai people continued to make rock art well into the last century.

The Apache, Post-1500

At present, Apache rock art is more difficult to recognize in the Verde Valley. Apache people probably made some scratched designs, and there are thick, cream-colored Apache pictographs near Payson. One particular style in the Verde Valley that seems to be uniquely Apache consists of deeply incised lines in a variety of sizes and orientations that resemble awl- or axe-sharpening grooves. The channels are not always straight lines, however, as we would expect for sharpening grooves. Some are curved, and some are located at angles in the rock face that could not have been used for sharpening. People also used this technique to create asterisks, crosses, and horse-like animals with abraded bodies, necks, and heads, but incised legs. Small holes and rows of holes abraded into sandstone and limestone are also typical.

Most sites with this style are found in the eastern side of the valley, at sites historically used by Apache, and in documented Apache country further east. Examples in the Sedona area usually occur in discrete panels not associated with earlier styles, and they are sometimes set apart from the other rock art panels.

Enduring Testaments

Rock art's appeal endures today, and we marvel at these expressions from the past. Yet, we must remember that we cannot know what the images meant to those who made them. Only members of that society, who knew the value system and traditions behind it, could know the intent and content of the imagery. Rock art inspires us to consider those who came before and to appreciate the complex social connections and belief systems that defined their worlds. ▣



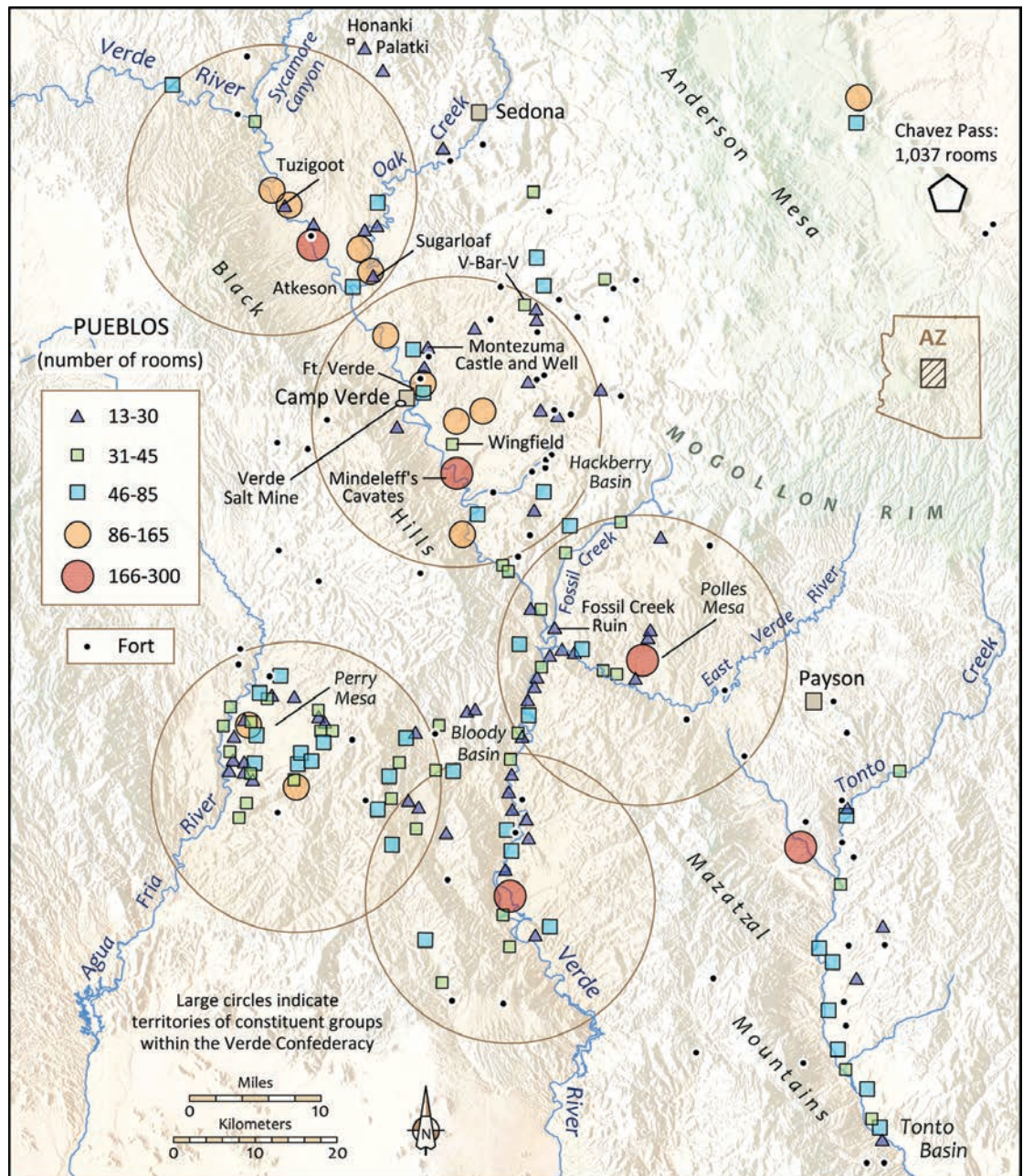
Top: This Yavapai horseman with feather headdress was likely drawn before the 1860s, when Euro-Americans started to settle in the Verde Valley. Bottom: Until recent years, rock art was barely visible in archaeological survey records for the Verde Valley—but that has changed through the work of dedicated volunteers. Volunteers from the Verde Valley Chapter of the Arizona Archaeological Society, the Verde Valley Archaeology Center, and numerous service organizations, including the Sierra Club, Elderhostel (now known as Road Scholar), Arizona Archaeological Society's Rock Art Recording Field School, Rupestrian CyberServices, and Friends of the Forest, have identified 250 rock art sites in the Verde Valley. Crews have documented approximately fifty sites in detail, including the four largest rock art sites on the Coconino National Forest, each with more than 2,000 elements. PHOTOS: PETER J. PILLES JR.

Verde Valley Archaeology in Macroregional Context

DAVID R. WILCOX

Although archaeologists have learned much about the broad outlines of culture history in the Verde Valley over the last 150 years, we have only recently begun to understand social and political dynamics in the period after A.D. 1100. Over several centuries before 1050, the scant data available seem to indicate that the Verde—like Agua Fria to the west—was a hinterland of Hohokam populations centered in the Phoenix Basin 90 miles to the south. But, by 1050, people in the Verde Valley were also using Kayenta pottery from the northern Southwest. Connections between the Verde Valley and the north would soon intensify, helping to transform central Arizona into a hinterland of ancestral Hopi populations living on the Colorado Plateau in northern Arizona.

From 1100 to 1275, inhabitants of the Verde Valley were making brown and red ware pottery, using diverse hilltop sites, and living in farmsteads or small hamlets. This general pattern, the Central Arizona Tradition, is seen across a broad area, from the Mogollon Rim on the north, to the foothills north of Phoenix in the south, west to the Mohon Mountains, and east to the Mazatzal Mountains. The Central Arizona Tradition (CAT) can be thought



The Verde Confederacy, A.D. 1250–1425, with some major sites in the Verde Valley indicated. People in neighboring communities along the Verde River and on Perry Mesa cooperated socially and economically, and they used a series of hilltop lookouts for communication and defense. The large circular areas represent the likely general territories of each group in the Verde Confederacy. MAP: ORIGINAL BY JODI GRIFFITH, ADAPTED BY CATHERINE GILMAN

of as a kind of tribal political entity, in which socially diverse groups with similar lifeways cooperated at a broad scale. Recent research has identified likely sociopolitical boundaries within the CAT, and there is evidence that people of the CAT were influenced by Kayenta cosmology and by toad and raptor symbolism that emerged in the Flagstaff area in the later 1100s.

Starting at about 1260, as ancestral Hopi groups began settling in the Winslow area, a gateway community to the southwest, Chavez Pass, grew larger (see map on facing page). This community had already been a conduit for moving northern painted pottery to CAT groups.

By 1275, the CAT groups coalesced into large hamlets and small villages in the Middle Verde, Bloody Basin, and the Lower Verde, and on Polles and Perry Mesas. Chavez Pass and Homol'ovi I became large villages of more than 1,000 rooms each. The prevalence of Hopi yellow ware pottery by 1325 represents a Hopi Macroeconomy that Verde Valley residents actively participated in, arguably sending cotton textiles, sandals, agave products, hides, meat, Government Mountain obsidian, and other items northward via Chavez Pass and the Homol'ovi settlements.

How do we explain these changes in regional settlement systems and related changes in site-deployment strategies, line-of-sight communication networks, and defensible site structures? I propose that the irrigation-intensive Hohokam



View from a typical fourteenth-century pueblo on Perry Mesa. Arguably, such locations would have been defensible. PHOTO: ©ADRIEL HEISEY

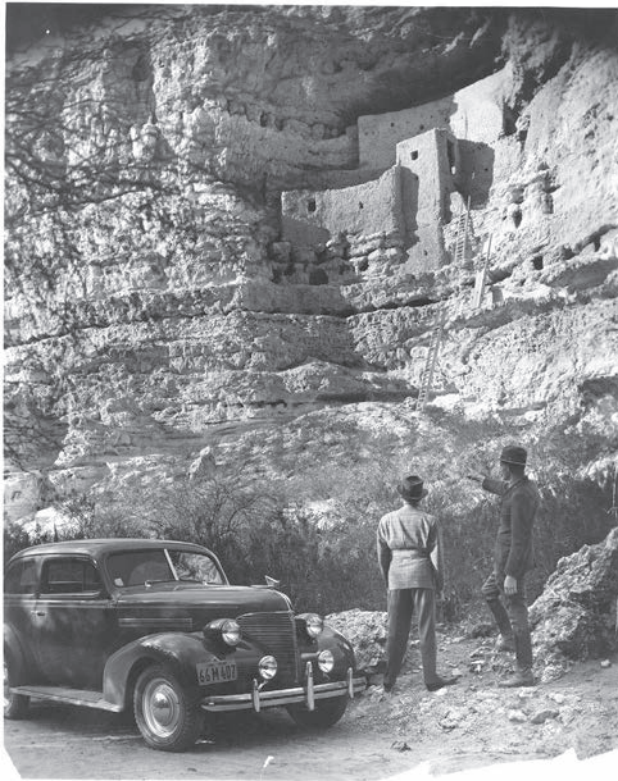
imposed upon CAT groups for labor. This oppressive relationship escalated around 1275, when a “Verde Confederacy” formed as a radical reorganization of the CAT, opposing the Hohokam and allying itself economically to ancestral Hopi populations. Based on data from recent archaeological surveys, I think the southern Middle Verde Valley portion of this confederacy struggled with internal tensions and ultimately split into two parts around 1325–1350. The presence of Roosevelt Red Ware (Salado polychrome pottery) in the southern remainder of the Verde Confederacy sites is intriguing, because it is nearly absent in northern Verde Valley sites—though a good explanation for this pattern remains elusive.

Catastrophic depopulation of the sizable Hohokam villages in the Salt River valley between about 1356 and 1380 fundamentally affected the balance of power and economic networks across neighboring regions. By about 1400–1425, people had also left Chavez Pass, sites in the Winslow area, the Verde Valley, and many other communities along the Mogollon Rim and in central Arizona. The previously thriving Hopi Macroeconomy must have required restructuring. New inquiry into what that meant, economically and politically, may help us understand why people left such a well-watered place as the Verde Valley after millennia of occupancy. One answer is that they always needed their neighbors, and never could be “an [autonomous] island unto themselves.”

A Delicate Balance

MATTHEW C. GUEBARD
NATIONAL PARK SERVICE

Archaeological tourism and preservation are intimately connected—and at odds. Beginning in the 1880s, county officials and local business owners realized the profitability of heritage tourism in the Verde Valley. The community began advertising the region's unique past to attract visitors—an early example of a burgeoning tourist economy. Within a decade, damage caused by sightseers became apparent. Concerned citizens formed the Arizona Antiquarian Association in 1895, funding the first stabilization of Montezuma Castle two years later.



That project began an era of growing public interest and archaeological preservation in the Verde Valley. Railroads and automobiles made visiting even easier. Archaeologists began to consider a more proactive strategy for protecting fragile places while promoting visitation. By the 1930s, local and federal governments were developing archaeological sites as attractions. Civil servants stabilized ancient walls and installed amenities, such as bathrooms, paved trails, and interpretive signs.

Today, archaeological tourism in the Verde Valley is a million-dollar industry. The National Park Service (NPS) and the U.S. Forest Service manage sites on public land. Thousands of people visit these sites each day, and a smaller number explore hundreds of backcountry sites on federal land. Each year, the number of visitors rises, making proactive management difficult. We continue to stabilize and develop sites, but there are limitations. For example, certain materials may accelerate damage or change a site's appearance over time. Similarly, paved trails and other modern features are expensive to build and maintain. With this in mind, how should the valley's sites be managed in the future?

Beginning in 2013, NPS began a remote-sensing program to record archaeological sites at Montezuma Castle, Montezuma Well, and Tuzigoot using Light Detection and Ranging (LiDAR) technology. LiDAR uses focused laser pulses to record the form and layout of features such as walls and floors. Combined with management and visitation records, these data help quantify damage over time. In this way, archaeologists may use LiDAR to understand the relationships among visitation, damage, and preservation. The park service will also use these data to interpret sites. LiDAR provides a way to reconstruct and interpret ancient architecture, enabling visitors to explore a site without damaging it. Technology cannot wholly replace the experience of visiting in person, but it does provide less invasive ways of protecting, preserving, and interpreting the Verde's special places for the future. ■



Top: National Park Service archaeologist Earl Jackson discusses Montezuma Castle with a visitor circa 1938. Bottom: A National Park Service employee uses a LiDAR scanner to map the Swallet Cave site at Montezuma Well in 2014. PHOTOS: COURTESY OF THE NATIONAL PARK SERVICE



The Verde Valley Archaeology Center

JAMES GRACEFFA AND TODD W. BOSTWICK
VERDE VALLEY ARCHAEOLOGY CENTER

Located in Camp Verde, the Verde Valley Archaeology Center (VVAC) is a 501(c)(3) nonprofit organization that preserves archaeological sites and collections in the Verde Valley region, curates these collections locally, and makes them available for research and education. The VVAC also develops partnerships with tribal groups and local communities and fosters a deeper understanding of ancient and Native American history in the valley. A Board of Directors and an Advisory Board comprising professional and avocational archaeologists, Native Americans, and local citizens govern the VVAC. Today, the organization has more than 350 members, many of whom also participate in the Verde Valley Chapter of the Arizona Archaeological Society.

Ken Zoll (see pages 11 and 14), Jim Graceffa, Bud Henderson, Sharon Olsen, and Ron Krug founded the VVAC in October 2010 to promote Verde Valley archaeology. The incredible archaeological resources of the Verde Valley have long attracted professional interest—and that of pothunters, unfortunately—but researchers have systematically studied the region only in recent decades. Previously, materials recovered from the Verde Valley were curated in out-of-state museums or in repositories in Prescott, Flagstaff, and Tucson. We established the VVAC to keep local collections in their region of origin, and to provide a hub for research and education.

The VVAC also assists government agencies, contract firms, and private landowners with cultural resource management and research projects. We have participated in surveys, excavations, analyses, and other projects for the Coconino and Prescott National Forests, the National Park Service, the Museum of Northern Arizona, the Archaeological Conservancy, Arizona Public Service, and the Town of Camp Verde. To review the VVAC's collections policies and field manuals, visit our website.

In just three years, the VVAC has successfully raised awareness of the importance of protecting archaeological resources in the Verde Valley. The Town of Camp Verde, local landowners, and students have a greater appreciation of the meaning and value of this beautiful region's heritage. The Governor's Archaeology Advisory Commission (GAAC) has recognized these efforts by honoring the VVAC with the 2014 GAAC Award in Public Archaeology. 



Top: Verde Valley Archaeology Center (VVAC) members Bud Henderson, R. J. Smith, and Jerry Walters surveying on Wingfield Mesa. Bottom: The headquarters of VVAC are located near Fort Verde State Historic Park in a building provided by the Town of Camp Verde. This facility contains a secure collections room, a laboratory, a library, a meeting room, a variety of permanent and temporary exhibits, a bookstore, and a children's area. In addition to the exhibitions, the mission of the VVAC is realized through a range of programs, including lectures by well-known archaeologists and Native American speakers, archaeology hikes and tours, activities in local schools, and annual Archaeology Fairs and Native American Art Festivals. We announce programs in a quarterly newsletter and on our website, verdevalleyarchaeology.org. TOP PHOTO: PETER J. PILLES JR.; BOTTOM PHOTO: TODD W. BOSTWICK

The Future of Verde Valley Archaeology

PETER J. PILLES JR.
COCONINO NATIONAL FOREST

Southern Arizona archaeology has benefitted tremendously from large archaeology projects undertaken to mitigate infrastructure expansion and housing development, but such opportunities are not likely to arise in the Verde Valley. Although excavations might address many questions in Verde Valley archaeology, what noninvasive means might we use to further research?

Numerous excavations—legal and illegal—have resulted in substantial collections that no one has studied or reexamined for more than fifty years. These include collections made by

Mearns (see pages 6–7), Mindeleff (see pages 7 and 9), Fewkes (see page 7), and Morris (*Archaeology Southwest Magazine* 28:1) now housed at the American Museum of Natural History, Smithsonian Institution, Arizona State Museum, Western Archeological and Conservation Center, and the Yavapai-Apache Nation. Application of modern analytical and dating techniques to these collections should yield new information about Sinagua material culture, trade relationships, textile technology, and room functions.

Similarly, most contemporary reports are “gray literature”—circulated in small professional circles, but not interpreted for or shared with the general public. Making reports available on the Digital Archaeological Record (tDAR) has been a good first step, but a huge backlog awaits scanning. Meanwhile, extracting information from these reports about plant and animal use should provide crucial information about ancient diet, farming, and hunting.

Reanalyses of existing pottery collections, using tools and techniques developed in recent years, should provide information about pottery exchange, relationships with other regions, settlement shifts through time, and new methods for dating of sites. It is difficult to use pottery to date Southern Sinagua sites at present, because people used the same kinds



Top: Tuzigoot Red bowl with plaster patch (left; Museum of Northern Arizona [MNA] No. A5236) and Salt Red Smudged (or possibly Verde Red Smudged) bowl (right; MNA No. A5237). Potters living in the region stretching from the Salt River Valley north to Flagstaff and east into the Tonto Basin made red ware bowls and jars, often with polished black interiors. After about 1300, potters were using the same technology to form these vessels, and they have similar shapes. What does this mean in terms of cultural relationships? Bottom: Tuzigoot White-on-red bowl (Sharlot Hall Museum No. X73.1830.515). Infrequently, people painted thin, white-lined designs on the exterior of red ware vessels. These, too, have similar designs from the Salt River Valley to Flagstaff to the Tonto Basin. PHOTOS: PETER J. PILLES JR.

of plain ware pottery for a very long time. Only approximately one-third of recorded sites can be satisfactorily dated. For the Northern Sinagua, researchers have distinguished roughly sixteen kinds of temper (material added to potters' clay), but at present, we have identified only a few for the Southern Sinagua. Formal definitions of temper variations would help us identify pottery-production centers and exchange patterns within the region.

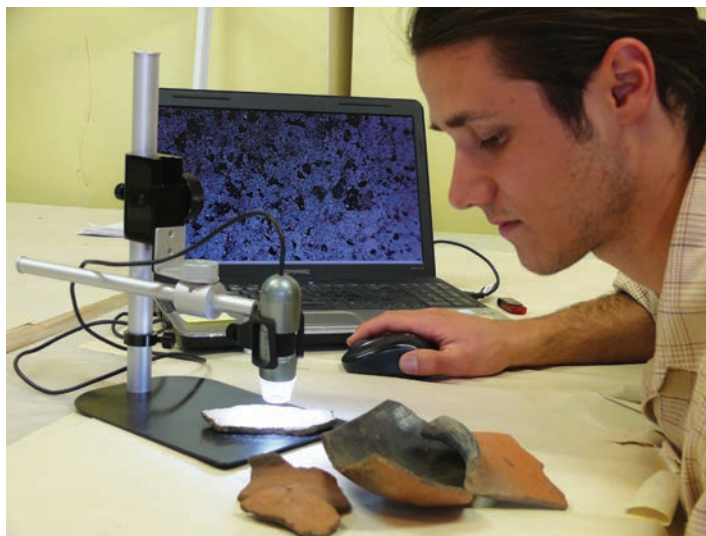
For example, we know that much plain ware pottery found at Tuzigoot and Montezuma Castle was not made there. Comparisons of Sinagua vessel shapes, plain ware-to-red ware proportions, and their frequency of smudging (polished black interiors) with vessels from Perry Mesa, the Tonto Basin, and the Salt River Valley, would provide new information about the relationships among those areas (see pages 18–19) and their ceramic traditions. Detailed studies of buff ware sherds aimed at determining where potters made those vessels could identify the directions from which Hohokam influences came into the Verde. New approaches for dating plain wares—thermoluminescence dating and median sherd thickness—also seem promising.

Still, the most important and productive research direction is archaeological survey, which could address almost every important question in Verde Valley archaeology. Surveys have documented roughly 13 percent of the Verde Valley. Mindeleff's work demonstrated how survey might illuminate relationships among land-use patterns, social organization, agricultural production, and population estimates. New surveys by the Arizona Archaeological Society's Verde Valley Chapter and the Verde Valley Archaeology Center bear this out.

We know almost nothing about the flanks of the Mogollon Rim, the region south of the Black Hills, the Red Rock canyon country near Sedona, or the terraces of the Verde River. The latter are especially significant, because most early Southern Sinagua sites are in that zone. Unfortunately, most of that land is in private ownership, and access is limited.

Periodic symposia, such as the conference held by Verde Valley Archaeology Center in 2012, could address big-picture questions: Who were the Southern Sinagua? How do they relate to the Central Arizona Tradition (see pages 18–19)? What, exactly, was the relationship with the Hohokam? Given remarkable climate and soils in the Verde Valley, why does it seem that agriculture began a bit later than in other regions of the Southwest, in about the fifth century A.D.? Archaic period projectile points and special-use sites occur throughout the valley, especially in the Sedona area—but where are the habitation sites?

Accomplishing any of these studies will take years, and there are comparatively few archaeologists working in the Verde Valley. We have a much larger cadre to draw from, though. Through the Arizona Archaeological Society's certification program, many people trained in archaeological techniques have amply demonstrated the ability to perform professional-quality work. I hope that their participation will continue, benefitting our understanding of the Verde Valley's rich past. ■



Top: Zack Curcija, Northern Arizona University, uses a digital microscope to examine and photograph temper varieties in Verde Valley plain wares. Potters added temper materials to their clays to enhance plasticity and to prevent cracking during forming and firing. New approaches to temper identification, such as this digital microscope, are helping archaeologists document where pottery was manufactured. Bottom: The use of portable XRF to analyze the elemental composition of mineral materials has increased markedly in recent years (see Archaeology Southwest Magazine 26:2). It is proving highly valuable for identifying the sources of obsidian and some rhyolites used for projectile points, as well as the pigments used to make paint for artifacts and pictographs. PHOTOS: PETER J. PILLES JR.



back sight

Technology transfer. It is something we hear a great deal about in the media. Generally, it involves high-tech specialists who develop innovative ways to do things—either better ways to do things that we have long done, or brand-new ways to do things we simply have not done before, because we lacked the capability to do so.

One of the major ancient technology transfers that Archaeology Southwest has tracked for decades is the movement of agriculture from Mesoamerica into the Southwest. In 1999, when we changed the name of this publication to Archaeology Southwest, the first topic we addressed was early farming in the Southwest—and, ten years later, we revisited the topic because subsequent discoveries were so dramatic.

The movement of agriculture into the Southwest left two strong archaeological traces: charred fragments of ancient corn kernels or cobs, and buried remnants of irrigation ditches—and even fields—where farmers grew maize crops. All indications are that maize cultivation moved swiftly across the landscape of the Southwest. Early pithouses and maize and even pottery are known from 4,100 years ago in Tucson. Early maize also dates to 4,100 years ago at the Old Corn site, which is almost 200 miles away, near Zuni in northwestern New Mexico.

At present, evidence for agriculture in the Verde Valley dates to the A.D. 400s (see page 23). I suspect that with time and targeted research, archaeologists and specialists will be able to push that date back a few thousand years. The subtle markers of farming settlements during the first two millennia B.C. make it very difficult to trace early farmers.

Geomorphologists can identify the most likely places for early farming, and they can help read the stratigraphic layers exposed in the banks of downcut river channels. Flaked stone specialists can help focus on projectile points from the Early Agricultural period. The search can occur in a Preservation Archaeology framework: heavy on survey and low-impact methods, as Pilles calls for (pages 22–23), and light on digging.

The joy of science is that regardless of the outcome, this is exciting research. If researchers discover that the advent of agriculture in the Verde Valley is earlier than the 400s, then the pattern of rapid technology transfer is further expanded. If early agriculturalists really did bypass the rich floodplains of the Middle Verde, then, as Pilles notes (see page 23), the challenge is to explain why. I look forward to what my colleagues working in the Verde Valley find. □



Members of the Arizona Archaeological Society have assisted the Coconino National Forest with archaeological surveys and excavations since 1976. Here, Jim Graceffa, Bud Henderson, June and Jerry Ehrhardt, and Joy Henderson are helping Peter Pilles survey near Mindeleff's Cavate Lodge Group. PHOTO: ANNE W. WORTHINGTON

back sight (băk sīt)

n. 1. a reading used by surveyors to check the accuracy of their work. 2. an opportunity to reflect on and evaluate Archaeology Southwest's mission.

William H. Doelle

